



Key data on sustainability at Lufthansa  
Issue 2007

# Balance

Company/Social responsibility/Environment/Corporate citizenship

The Lufthansa Airbus A380s will be powered by the lowest-emission turbofan engines in the world: These Rolls-Royce Trent 900 engines have a fan diameter of 2.95 meters, making them the largest jet engines Rolls-Royce has ever built. Their latest-generation fan blades feature three-dimensionally curved surfaces and a swept fan design, which mean even lower noise emissions and higher aerodynamic efficiency.

## At a glance

<b>Key business performance data<sup>1</sup></b>		<b>2006</b>	2005	Change
Revenue	million €	<b>19,849</b>	18,065	+ 9.9 %
of which traffic revenue	million €	<b>15,354</b>	13,904	+ 10.4 %
Profit/loss from operating activities	million €	<b>1,078</b>	719	+ 49.9 %
Net profit/loss for the period	million €	<b>803</b>	453	+ 77.3 %
Operating result	million €	<b>845</b>	577	+ 46.4 %
Capital expenditure	million €	<b>1,929</b>	1,829	+ 5.5 %
Cash flow from operating activities	million €	<b>2,105</b>	1,956	+ 7.6 %
Total assets	million €	<b>19,461</b>	19,272	+ 1.0 %
Shareholders' equity	million €	<b>4,903</b>	4,522	+ 8.4 %

<b>Key personnel data</b>		<b>2006</b>	2005	Change
Number of employees (on December 31, 2006)		<b>94,510</b>	92,303	+ 2.4 %
of these, in Germany		<b>62,538</b>	61,012	
of these, outside Germany		<b>31,972</b>	31,291	
Staff costs	million €	<b>5,029</b>	4,853	+ 3.6 %
Revenue/employee	€	<b>212,196</b>	198,000	+ 7.2 %
Staff costs/revenue	percent	<b>25.3</b>	26.9	- 1.6% pts.
Average age	years	<b>40.2</b>	40.1	+ 0.3 %
Part-time ratio, absolute	percent	<b>25.7</b>	24.6	+ 1.1% pts.
Part-time ratio, men	percent	<b>13.7</b>	13.0	+ 0.7% pts.
Part-time ratio, women	percent	<b>42.6</b>	41.1	+ 1.5% pts.
Share of women in management	percent	<b>12.9</b>	12.7	+ 0.2% pts.

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**Environmental data<sup>2</sup>**

		2006	2005	Change
<b>Resource consumption</b>				
Fuel consumption	tons	<b>6,940,587</b>	6,751,355	+ 2.8 %
Fuel consumption, specific, passenger transportation	l/100 pkm	<b>4.38</b>	4.39	- 0.2 %
Fuel consumption, specific, freight transport	g/tkm	<b>182</b>	185	- 1.2 %
<b>Emissions</b>				
Carbon dioxide emissions	tons	<b>21,890,614</b>	21,293,772	+ 2.8 %
Carbon dioxide emissions, specific, passenger transportation	kg/100 pkm	<b>11.05</b>	11.07	- 0.2 %
Nitrogen oxide emissions	tons	<b>99,808</b>	97,281	+ 2.6 %
Nitrogen oxide emissions, specific, passenger transportation	g/100 pkm	<b>50.5</b>	50.8	- 0.5 %
Carbon monoxide emissions	tons	<b>15,658</b>	15,303	+ 2.3 %
Carbon monoxide emissions, specific, passenger transportation	g/100 pkm	<b>8.4</b>	8.4	- 0.2 %
Unburned hydrocarbons	tons	<b>1,902</b>	1,871	+ 1.7 %
Unburned hydrocarbons, specific, passenger transportation	g/100 pkm	<b>1.0</b>	1.0	- 1.3 %

**Transport performance data<sup>2</sup>**

		2006	2005	Change
Size of active fleet (on December 31, 2006) <sup>3</sup>		<b>497</b>	489	+ 8
Number of flights		<b>735,072</b>	714,775	+ 2.8 %
Passengers carried		<b>68,060,661</b>	65,344,048	+ 4.2 %
Freight carried	tons	<b>1,758,968</b>	1,735,771	+ 1.3 %
Seat kilometers offered, SKO	million pkm	<b>191,115</b>	187,284	+ 2.0 %
Freight ton kilometers offered, FTKO	million tkm	<b>11,717</b>	11,217	+ 4.5 %
Ton kilometers offered, TKO	million tkm	<b>30,430</b>	29,520	+ 3.1 %
Passenger kilometers transported, PKT	million pkm	<b>158,284</b>	155,192	+ 2.0 %
Freight ton kilometers transported (incl. third-party performance), FTKT	million tkm	<b>7,637</b>	7,053	+ 8.3 %
Ton kilometers transported, TKT	million tkm	<b>23,254</b>	22,368	+ 4.0 %

<sup>1</sup> Source: Lufthansa Annual Report 2006.

<sup>2</sup> The data presented refer to these companies: Lufthansa Passenger Airlines (including Lufthansa Regional: Lufthansa CityLine, Air Dolomiti, Eurowings, Contact Air, Augsburg Airways), Lufthansa Cargo, Condor Flugdienst GmbH, Condor Berlin GmbH, Thomas Cook Airlines UK and Thomas Cook Airlines Belgium.

<sup>3</sup> Please see also the overview "Group fleet" on page 33.



Dear Readers,

Following a highly successful 2006, the crane has continued its sharp climb at the beginning of this year as well. Our strategy of sustainable and profitable growth is bearing fruit. Our business results are developing in more than respectable ways. We are setting new records in passenger numbers and levels of customer satisfaction. All this has given lift to the share price and to our work. 2,500 new jobs in Germany alone and investments in latest-generation aircraft show that we firmly believe in Lufthansa's potential for the future.

This new issue of *Balance* is being published at a time when the debate on the Earth's climate has become the dominating topic in the political and social discussions throughout the media. Now more than ever, it is important to avoid inappropriate or populist reflexes and to ensure instead that politics, business and consumers jointly launch sustainable approaches that lead to solutions. The need for mobility continues to increase and to generate more traffic on roads, rails, sea routes and airways. Therefore, we need to find ways of organizing mobility as environmentally compatibly as possible.

Within its own sphere of influence, Lufthansa has done much for many years to achieve the lowest-possible CO<sub>2</sub> emissions. We invest in scientific research and the latest technology, and we drive innovation. Fuel-efficient aircraft have always been our hallmark. The fleet modernization we decided on last year is the biggest investment in new aircraft in the company's history and gets us a good bit closer to our goal of the 3-liter aircraft. We have achieved a decoupling of transport performance and emissions. Reducing fuel consumption is in our own best interest as it helps lower a significant cost item.

Externally, we hope that the current debate will help to shed more light into the darkness, that myths will cease to be circulated and that easily realizable, large-scale improvements will be driven forward instead. Two examples are the standardization of European air traffic control and the optimization of intercontinental flight routings. In these areas as well, we would be very pleased to make our contribution to realizing sustainable solutions.

I wish you a captivating read and look forward to pursuing the dialogue with you.

A handwritten signature in black ink, appearing to read 'W. Mayrhuber'. The signature is stylized and fluid, with a large initial 'W' and 'M'.

**Wolfgang Mayrhuber**

Chairman of the Executive Board and CEO  
Deutsche Lufthansa AG

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## About this report

The goal of this report is to provide stakeholders and other interested publics with comprehensive information about the Group's activities, progress and goals in the areas of economy, social responsibility, environment and corporate citizenship. *Balance 2007* is based on the financial year 2006.

This report is divided into four main chapters.

- The chapter **Our business** focuses on Lufthansa's economic development, as economic success provides the basis for our sustainable business activities. Additionally, readers gain an overview of the Group's different business segments, its fleet and its transport performance.
- The chapter **Social responsibility** examines topics including Lufthansa's pioneering role in implementing a sustainable personnel strategy. In this context, the Group consistently builds on the use of the Internet and has created innovative tools for finding qualified junior employees and creating their long-term loyalty to the company.
- The chapter **Environment** focuses on the area of flight operations and highlights the measures that Lufthansa has implemented to cut kerosene consumption as well as CO<sub>2</sub> and noise emissions lastingly and to conserve energy and water.
- The chapter **Corporate citizenship** informs about the Group's social and cultural activities, as well as its numerous environmental sponsorship projects. Readers also find out what effect award miles can have when they are donated for charitable purposes.

### Scope of consolidation

It is not always possible to gather standardized personnel and environmental data Group-wide. There are a number of reasons for this: For example, the personnel and environmental management systems operated by the individual, independently acting companies are at different stages of development. In addition, there are dynamic processes of change within the Group's portfolio.

Some of the data presented in this report refer to a basis differing from that applied in the Lufthansa Annual Report. While the Annual Report must fulfill the requirements of economic evaluation, *Balance* emphasizes a comprehensive consideration of the effects the company's activities have on the environment and society. This difference in perspective leads to differing values for transport performance and the size of the fleet.

### Transport performance, kerosene consumption and emissions

The economic performance indicators in the Annual Report are based on the number of revenue passengers. By contrast, this Sustainability Report takes into account all the passengers on board – including traveling employees and passengers taking advantage of Miles & More award tickets. The reason: Every traveler that boards an airplane affects the environment.

The data used for calculating transport performance, kerosene consumption and emissions were drawn from the following companies: Lufthansa Passenger Airlines (including Lufthansa Regional: Lufthansa CityLine, Air Dolomiti, Eurowings, Contact Air, Augsburg Airways), Lufthansa Cargo, Condor Flugdienst GmbH, Condor Berlin GmbH, Thomas Cook Airlines UK and Thomas Cook Airlines Belgium.

### Evaluation and validation of data and information

### Methodology of calculations

#### Disclaimer in respect of forward-looking statements

The data included in this report has been collected and processed with the utmost care. Nevertheless, errors in transmission cannot be ruled out entirely.

Information published in this report with regard to the future development of the Lufthansa Group and its subsidiaries consists purely of forecasts and assessments and not of definitive historical facts. Its purpose is exclusively informational, identified by the use of such cautionary terms as "believe," "expect," "forecast," "intend," "project," "plan" or "estimate".

These forward-looking statements are based on all discernible information, facts and expectations available at the time. They can, therefore, only claim validity up to the date of their publication.

Since forward-looking statements are by their nature subject to uncertainties and imponderable risk factors – such as changes in underlying economic conditions – and rest on assumptions that may not or divergently occur, it is possible that the Group's actual results and development may differ materially from those implied by the forecasts. Lufthansa makes a point of checking and updating the information it publishes. It cannot, however, assume any obligation to adapt forward-looking statements to accommodate events or developments that may occur at some later date. Accordingly, it neither expressly nor conclusively accepts liability, nor gives any guarantee for the actuality, accuracy and completeness of this data and information.

### Size of the fleet

There are also differences with regard to the size of the fleet: The scope of consolidation applied in the Annual Report indicates the total number of aircraft in the Group fleet (2006: 430 aircraft), which means all aircraft in the Group's legal or economic possession and those currently under lease. By contrast, this Sustainability Report takes into account the fleet actually operated by the Group – as only these aircraft have an effect on the environment that Lufthansa can control – and also includes the participation in Thomas Cook (see also table "Group fleet" on → page 33).

### Environmental management system

The data used in this report were collected by means of Lufthansa's environmental management system. This system also determines the methods for data verification and its transmission to the division Group Environmental Concepts. The basis for data collection is Lufthansa's own database for sustainability (see also article "Environmental care has a long tradition" on → page 58).

### Emissions

The calculation of emissions from flight operations is based on the actual transport performance and fuel consumption for the year in review. In this context, each aircraft-engine combination that exists in the fleet is considered separately, and the corresponding values are calculated by means of computer programs provided by the respective aircraft and engine manufacturers. The annual average flight profile of each such subset in the fleet is then fed into these programs. This allows us to determine emissions in relation to flight altitude, distance flown, thrust and load.

This approach is necessary for nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO) and unburned hydrocarbons (UHCs) in particular. CO<sub>2</sub> emissions do not require special calculation methods, as they are generated in a fixed relationship to the quantity of kerosene burned.

### Specific consumption and emission values

Calculating specific consumption and emissions entails expressing absolute values in relationship to transport performance. For example, the ratio "liters per 100 passenger kilometers" (l/100 pkm) is calculated on the basis of actual transport performance and kerosene consumption figures. Therefore, the latter also includes fuel consumed during taxiing, flying in holding patterns and detours during flight.

### Accuracy

The figures shown in the tables are rounded due to considerations of presentation. However, values indicating changes from the previous year always refer to precise figures. For this reason, it is possible that a specific value may remain the same from one year to the next, while a relative change is indicated.

## Corporate Governance

## Principles of Strategy of the Lufthansa Group

Flying is one of mankind's oldest dreams. Today, this dream has nearly become a self-evident part of daily life – at least for those living in the industrialized nations.

To help make this dream come true for everyone someday, Lufthansa has taken an active role in the development of the air transport industry ever since its founding. The ability to develop future-oriented ideas and to translate them into innovative products will remain an important driving force for the Group's success in the future.

Over the past decades, the airline has evolved into a successful globally active company which positions itself today as a focused aviation group. The airline's key goal is profitable long-term growth. This requires strengthening and expanding the airline's own leading position as well as those of its European partners.

Lufthansa's corporate values are the basis on which this goal is to be achieved:

### Long-term profitability

In the interests of our investors, we strive for sustainable and pacesetting value creation in the aviation business. That goal is furthered by sound risk and financial management.

### Focus on customer benefits

The customer is central to our business activities. We consistently tailor our services to customers' needs and offer a wide range of products for different target groups. All our efforts are service-oriented and synonymous with quality, innovation, competence and reliability.

### Accent on core skills

Our core skills consistently determine our activities. Those skills encompass management of flight networks, nurturing partnerships, operating processes on the ground and in the air as well as the provision and maintenance of infrastructure and production factors.

### System integration sets the pace

Intensive system integration strengthens our competitive advantage over other locations, airlines and alliances. We cooperate closely with major partners, suppliers and infrastructure providers in integrating and optimizing our core processes.

### Attractive working environment

Our staff is integral to our success. We offer them good working conditions, commensurate incentives for personal development and an energizing, international corporate culture. That makes us an attractive employer for qualified, motivated and service-minded personnel.

### Social responsibility

We are committed to keeping a balance between business and social prerogatives. Environmental protection and sustainable development are prime objectives of our corporate policy. Active engagement in social projects is ingrained in our corporate culture.

Beyond this, the Lufthansa Group established ten binding, Group-wide Environmental Guidelines in 1996 (see also "Environmental goals and measures" pages → 69 to 71).

→ <http://responsibility.lufthansa.com>

## Stakeholder dialogue **Trust is the basis for success**

Guiding a company in a responsible manner is only possible by maintaining a dialogue with its stakeholders.

For this reason, Lufthansa actively seeks a constructive and critical exchange with those stakeholder constituencies who are open and willing to help shape the future in sustainable ways (see also graphic “Lufthansa stakeholder dialogue” on → page 9). The Lufthansa Group understands the integration of stakeholder groups in corporate decision-making processes as a continuous process. The company not only conducts this dialogue on various levels but also incorporates the insights it gains from this exchange into its actions.

A lively dialogue takes place, for example, with stakeholders from politics, media and business at Lufthansa’s hubs in Frankfurt and Munich. In this spirit, the hub management in Frankfurt takes advantage of regular exchanges with the region’s mayors, members of the state parliament of Hesse and Hessian members of the German Parliament to impart current information about the aviation industry and knowledge about the international air transport market. It also explains Lufthansa’s particular situation at Frankfurt Airport, its home base. With 36,000 employees at this airport, the company is Hesse’s largest employer.

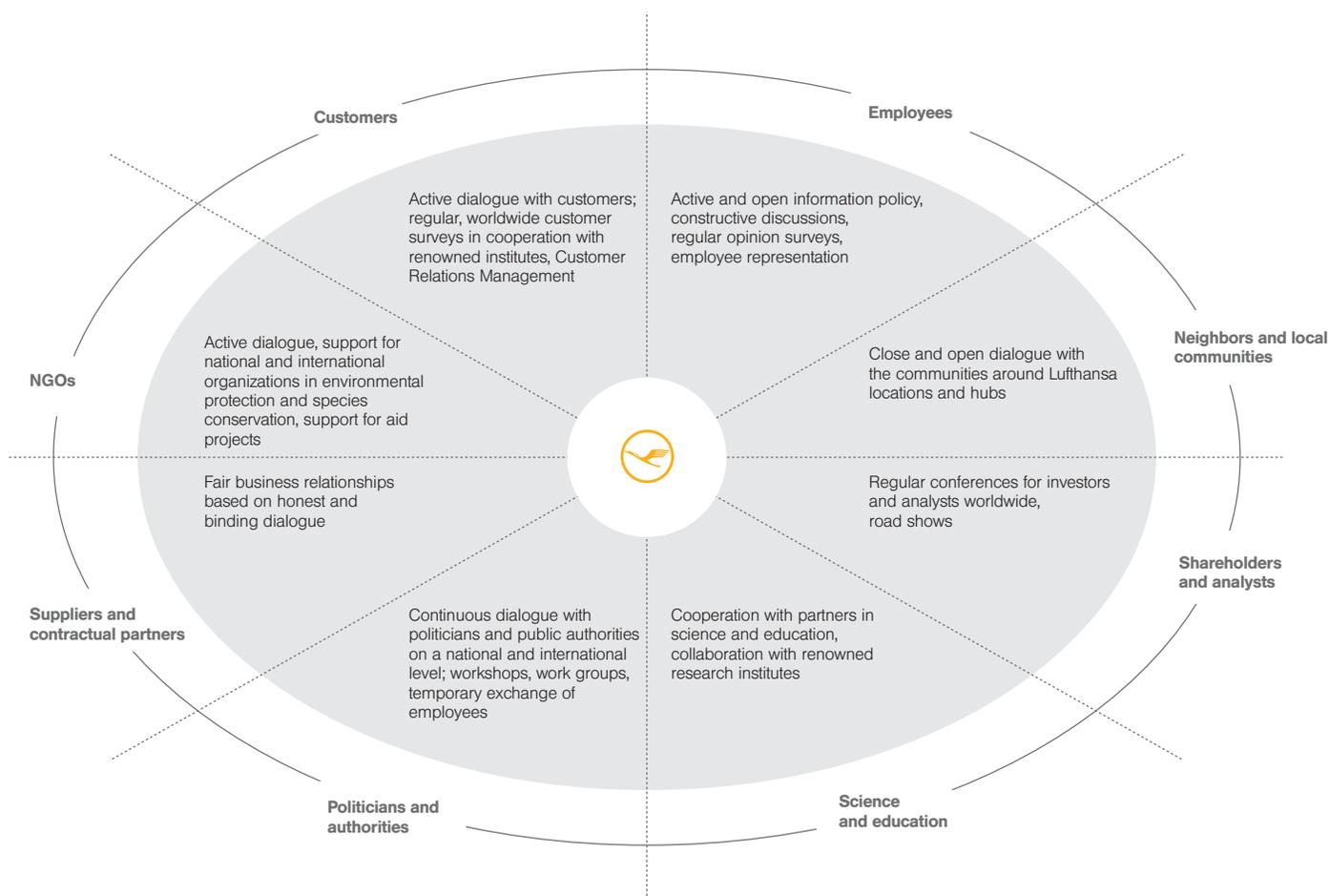
Likewise, the planned, extensively discussed expansion of Frankfurt Airport is an ongoing object for political dialogue. Another topic is the great importance of Lufthansa’s Frankfurt hub for international air transport and the related interlinking of the worldwide flows of passengers and cargo. Updates on large-scale projects, such as stationing the Airbus A380, round off the scope of these discussions.

This dialogue with politicians is accompanied by discussions with representatives of the regional and national media. Additionally, the head of hub management in Frankfurt maintains continuous contacts with key business representatives in the region. After all, the excellent air links from Frankfurt are a decisive factor in the region’s favor as a business location for industrial and service companies.

### **“Partners for Excellence” – the dialogue with our service partners at Frankfurt Airport**

The stakeholder dialogue maintained by the hub management in Frankfurt also entails close cooperation with the ground handling partners for our flight operations. Flying starts on the ground, as is demonstrated on a daily basis not only by those Lufthansa departments directly involved but also by other Lufthansa Group companies, external service providers and public authorities, such as customs or the Federal Border Guard. To ensure a smooth interaction among ground handling partners, it is indispensable to exchange information and share a common understanding of Frankfurt Airport as the Lufthansa Group’s largest and most central hub. Since 2005, the hub management in Frankfurt has concentrated on defining shared goals and projects within this system partnership to advance the regular exchanges between the “Partners for Excellence.”

And in Munich, the home of Lufthansa’s southern hub, regular discussions take place with representatives of the state government and the mayors of the communities surrounding the airport. Moreover, the hub management maintains intensive contacts with the authorities at the airport, those across the region and the city of



Stakeholder dialogue: Lufthansa actively seeks constructive and critical exchanges with its stakeholders.

Munich. In the context of its regional sponsoring program, the company also seeks a dialogue with various social groups, such as by establishing contacts with local sports associations and providing support for youth teams in the region. To preserve and increase the public's trust in the Lufthansa Group, it will remain a key task to communicate with stakeholders in an open, clear and continuous manner.

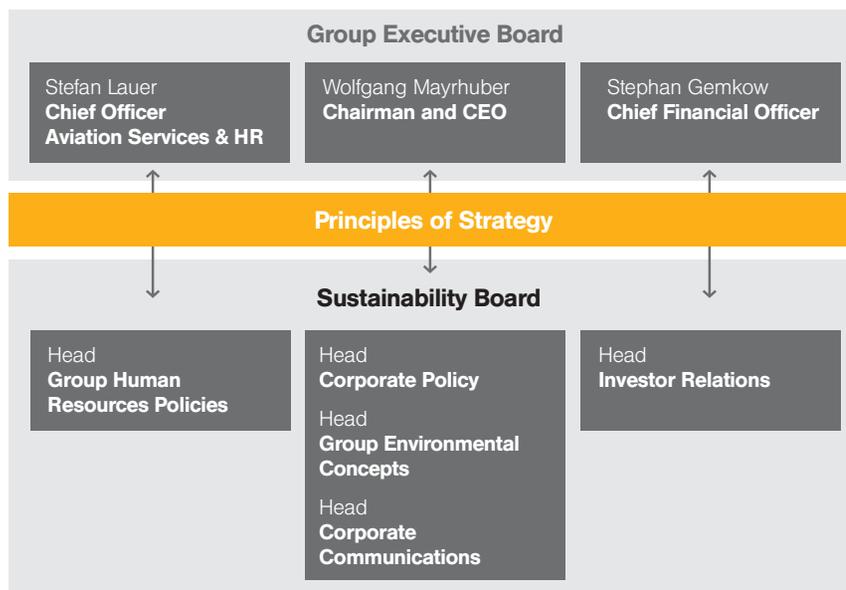
#### At Lufthansa, we focus on our customers

The company's long-term business success depends directly on the trust its customers place in Lufthansa. Therefore, the continuous dialogue between the airline and its customers is an important prerequisite for securing this success. Regular customer surveys tell the company more about the acceptance of its products and services, and thus offer information about potentials for improvement. The Lufthansa Passenger Airlines – in cooperation with renowned institutes – continuously conduct worldwide surveys and determine the level of satisfaction among their customers. This information is collated in a "Customer Profile Index," which informs the entire company about the current status of customer satisfaction in the form of a single figure.

Every year, a new target value is defined for this index. Reaching this value is also part of the personal goal agreements of the airline's managers. In addition, it serves to inform wide areas of the company about the current level of customer satisfaction and to formulate specific measures. The Customer Profile Index, which has been determined annually since 2001, reached a record high of 7,294 points for the entire year 2006. This was an increase of 83 points over the preceding year.

## Creating balance – maintaining balance

Lufthansa pursues corporate policies which are guided by the principles of sustainability and environmental protection and which blend harmoniously economic, ecological and social goals. Therefore, the company measures its entrepreneurial success in more than just balance sheet figures, yields and high levels of added value. Equally important is striking a balance of interests among its stakeholders, with whom Lufthansa maintains a continuous dialogue.



Sustainability is an integral part of our corporate culture, and its management is – as depicted on the right – organized.

### Profitability and strategy

Lufthansa pursues the goal of becoming the most attractive and most profitable airline with a global offer in order to expand the favorable market positions of its Group companies in a focused way. Future-oriented strategies, efficient structures and transparent processes form the basis for these efforts.

In 2006, the company achieved profitable growth. Revenues and results improved above all in the core business segment Passenger Transportation. Moreover, the Group was able to earn its cost of capital and increase the company's value. To preserve its ability to act in strategic dimensions, Lufthansa secures its investments financially. The basis for this approach is a financial strategy that aims at maintaining the Group's profitability, liquidity, stability and financial flexibility. In this way, the Group improved its financial profile further: The equity ratio increased to 25.2 percent and is set to rise to 30 percent long-term to sustainably strengthen the capital structure. To optimize the cost structure as well, each business segment launched specific cost-cutting programs.

As growth opens up enormous opportunities for Lufthansa in the air transport market of the future, it is judicious to complement organic growth options with the acquisition of other companies – provided they make sense strategically, fit the Group's concept and are economically sound. SWISS is a good example of Lufthansa's ability to successfully integrate new partners into the Group.

### **Management and corporate structures**

Lufthansa is a German stock company with headquarters in Cologne. The company employs the dual management structure ordinarily followed in Germany, consisting of an Executive Board and a Supervisory Board. While the Group's Executive Board is solely responsible for steering the company, the Group's Supervisory Board elects, monitors and advises the Executive Board. The basis for the organization of the Lufthansa Group's management and monitoring structures is formed chiefly by the German Stock Corporation, the Codetermination and Capital Market Acts, as well as the Articles of Association and the company-specific Corporate Governance Code.

Deutsche Lufthansa AG fulfills two functions: It is not only the ultimate parent company but also the largest operating company within the Group. In the business segment Passenger Transportation Lufthansa operates the scheduled passenger services.

The Group's five business segments (in 2006: six; see box "Thomas Cook AG" on → page 27) are individually responsible for their respective operations and results, and they report directly to the Group's Executive Board. Their management teams are continuously monitored by the respective supervisory bodies.

### **Corporate Governance at Lufthansa**

It is of great concern for Lufthansa to promote the trust of stakeholder groups in the management and monitoring of German companies that are listed on the stock exchange. Therefore, the Group regularly examines the standards for responsible corporate leadership which are accepted worldwide and recognized by the German Corporate Governance Code. On December 6, 2006, the Executive and Supervisory Boards passed an unqualified Declaration of Compliance.

Lufthansa complies with all the recommendations of the German Corporate Governance Code as well as most of the optional suggestions. The Corporate Governance elements at Lufthansa reflect both German corporate law and international standards. To promote and maintain the trust of investors, employees and the public, the Group practices an open and clear communication style.

At [www.lufthansa-financials.com](http://www.lufthansa-financials.com) the Group provides comprehensive information about these declarations of compliance as well as the implementation of the recommendations and suggestions.

### **Ethics at Lufthansa**

Lufthansa applies high standards in shaping its relationships with customers and business partners. All activities of the Group and its employees are in accordance with the basic principles of human community, including the respect for human rights. The company also documents this aspiration through its memberships in numerous associations and organizations which oblige it to practice ethical business conduct. This makes a "corporate law book" unnecessary from Lufthansa's perspective.

In 2002, Lufthansa became the first airline to join the "Global Compact," an initiative launched by former UN Secretary-General Kofi Annan. This forum encourages all companies to voluntarily adopt ethical principles in the areas of human rights, the environment and the fight against corruption and to actively promote their implementation (see also the box "Principles of the UN Global Compact" on → page 12). In addition, the Group is a member of organizations including the International Chamber of Commerce (ICC Deutschland), Transparency International and Deutsches Netzwerk Wirtschaftsethik e. V. (German Business Ethics Network).



#### Principles of the "UN Global Compact"

##### Human rights

The Secretary-General asks world business to:

- Principle 1. support and respect the protection of international human rights within their sphere of influence;
- Principle 2. make sure their own corporations are not complicit in human rights abuses.

##### Labor

The Secretary-General asks world business to uphold:

- Principle 3. freedom of association and the effective recognition of the right to collective bargaining;
- Principle 4. the elimination of all forms of forced and compulsory labor;
- Principle 5. the effective abolition of child labor; and
- Principle 6. the elimination of discrimination in respect of employment and occupation.

##### Environment

The Secretary-General asks world business to:

- Principle 7. support a precautionary approach to environmental challenges;
- Principle 8. undertake initiatives to promote greater environmental responsibility; and
- Principle 9. encourage the development and diffusion of environmentally friendly technologies;

##### Anti-corruption

- Principle 10. businesses should work against corruption in all forms, including extortion and bribery.

The Group's commitment to strict codes of conduct and environmental guidelines is also evidenced by its membership since 1955 in the International Chamber of Commerce (ICC). To shape its entrepreneurial activities in a responsible way, the Group has realized the recommendations of the ICC Commission "Business in Society." Additionally, it has adopted the "ICC Charter for Sustainable Development." This charter defines 16 principles of environmental management, including environmentally-oriented management as a key corporate goal, employee training in environmental issues, assessment of environmental effects, as well as research work to catalogue and reduce the effects of company-specific products, processes, emissions and wastes. The Group also adheres to the "ICC Guidelines for Fighting Corruption in Business."

→ [www.icc-deutschland.de](http://www.icc-deutschland.de)

#### Compliance

As adhering to legal and social standards is everyday practice at Lufthansa, the Group has not formulated its own Code of Conduct. Nevertheless, the company did introduce a compliance program in September 2004. Its goal is to familiarize employees with the Group's guidelines for conduct by providing pertinent information and thus to anchor those guidelines in their daily work routines. The compliance program contains three modules: Competition, Capital Market and Integrity.

#### Competition Compliance

The module Competition Compliance introduces employees to the relevant regulations of cartel legislation, so as to minimize or exclude risks for Lufthansa in this area.

#### Capital Market Compliance

The module Capital Market Compliance familiarizes employees with current capital market law, such as regulations relating to insider trading or ad hoc publicity. The goal is to keep both the Group and its employees from breaching the law. To ensure that the regulations of capital market law are respected and implemented, Lufthansa has established an internal Compliance Office, which maintains registers of all individuals with access to insider information. Additionally, an ad hoc clearing committee comprising staff from different company departments examines the facts of each case in terms of their ad hoc relevance.

#### Integrity Compliance

With the module Integrity Compliance, Lufthansa documents its fundamental approach of law-abiding conduct in business intercourse. The obligation for Lufthansa and its employees to adhere to non-corrupt and ethical conduct flows naturally from current law, the compliance guidelines and Lufthansa's memberships in related national and international organizations.

#### Responsibility for employees and society

Economic growth must serve social progress. Therefore, Lufthansa aims at creating a harmonious balance between the Group's economic goals and its responsibility toward individuals and society as a whole. In this spirit, the company has created tailor-made solutions over the past few years for its business segments and flight operations, allowing flexible changes at any time in response to shifting competitive conditions. With this step, Lufthansa has created the basis for maintaining jobs long-term and creating new jobs in accordance with demand.



### International alliances

“The Airline Network for Earth”: Under this motto Lufthansa initiated the Star Alliance in 1997 as the first and internationally leading airline cooperation. In 2007, it celebrates its 10-year anniversary. Since its foundation, the Alliance has grown from five to currently 17 members. Its goal is to offer customers a dense global network with coordinated departure and arrival times. The environment benefits from this approach as well, as higher levels of aircraft utilization lower the specific fuel consumption per passenger. Last year, the Star Alliance gained two more renowned airlines as members: South African Airways and SWISS. Three further carriers – Air China, Shanghai Airlines and Turkish Airlines – have also expressed their interest and are set to join in 2007. VARIG Brazilian Airlines left the cooperation on January 31, 2007, following internal restructuring. The bonus programs of the individual members are valid across the network and thus on the flights of all other Star Alliance partners.

### Risk management

Financial stability is the basis for the strategic evolution of the Lufthansa Group. For this reason, the company operates a Risk Early Warning and Management System to handle opportunities and risks in a reliable manner. At Lufthansa, risk management focuses on operational risks as well as financial and economic risks.

Safe flight operations are one of the key promises associated with the Lufthansa brand. The Group honors this promise with extraordinarily high safety standards in training its crew members and maintaining its aircraft. Regular training helps ensure that all processes and procedures are guaranteed at Lufthansa.

On the economic side, Lufthansa incurs risks related to capacities and utilization as well as in the areas of strategy, labor agreements, information technology, financing and treasury. To manage these risks, Lufthansa counts on appropriate control mechanisms and management techniques adapted to specific risks. The analysis of risks, including options available for limiting and eliminating them, is anchored in strategy development and thus flows into operative Group planning. For example, Lufthansa limits the risk of rising costs resulting from changes in fuel prices, interest rates and foreign exchange rates by applying systematic security management.

Moreover, Lufthansa ensures that its investment activities are secured financially in order to secure and implement profitably its growth strategy. “For us, three points characterize a sound balance sheet: appropriate equity capitalization, a low level of indebtedness and adequate liquidity. They create confidence among our investors, ensure us of a high degree of independence even in critical situations and save us financing costs. That is why financial and balance sheet strategy is for Lufthansa the highest form of risk management and precaution,” summarizes Lufthansa Chief Financial Officer Stephan Gemkow.

## General framework

## Challenges for our business

Air transport is an important economic force that helps create affluence and maintain social stability. As an important part of this international transport system, Lufthansa has created bridges around the world for more than 50 years – connecting people, ideas and cultures and helping to shape worldwide trade. To be able to exist in international competition, the Group also depends on a framework of favorable political and social conditions.



Central hub Frankfurt: The airport's planned expansion will generate long-term growth.

### Infrastructure

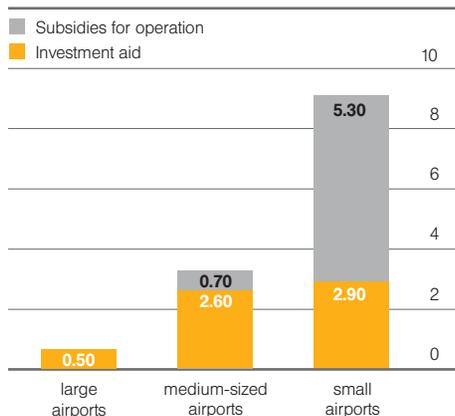
This includes the demand-oriented expansion of the airports in Frankfurt and Munich. On the one hand, expansion is needed to take advantage of the aviation industry's growth potential as consistently forecast by experts. On the other hand, it is needed to reduce kerosene consumption generated by delays on approach. In 2006, the aircraft of the Lufthansa Passenger Airline consumed an additional 142,000 tons of kerosene worldwide due to delays on approach, holding patterns and higher flying speeds – all to make up for delays related to infrastructure bottlenecks on the ground and in the air. This corresponds to 3.0 percent of that fleet's total fuel consumption for the year. Insufficient capacities can also lead to job losses, as in those cases where passengers increasingly choose to change flights at hubs abroad. That this is a valid concern is proven by the markedly lower growth rates in passenger numbers at Frankfurt Airport compared with other airports worldwide. To strengthen the hubs in Frankfurt and Munich long-term, Lufthansa supports the air transport industry's master plan for future-oriented airport development to the year 2020. This forms the necessary foundation to create the 60,000 new jobs projected by the initiative "Air Transport for Germany" and to handle the expected growth in air transport in an ecologically compatible manner.

### Single European Sky (SES)

Sustainable growth in air transport is also served by optimizing the infrastructure in the air. That is why Lufthansa demands that the member states of the European Union agree without further delay on a restructuring of the European airspace and realize the Single European Sky (SES) at long last. The SES not only promises more efficient traffic management in European air transport, but it also represents Europe's largest climate protection project. A study of the Eurocontrol Performance Review Commission (PRC) presented in December 2006 estimates the SES's European cost savings potential to be as much as 3 billion euros a year. Additionally, the SES would help avoid flying about 300 million kilometers of detours and longer routings each year. The world's climate council, the Intergovernmental Panel on Climate Change (IPCC), concluded already in 1999 that improvements in air traffic management could help reduce the CO<sub>2</sub> emissions from air transport by up to 12 percent. With respect to flights arriving at and departing from European airports, this implies avoiding more than 10 million tons of CO<sub>2</sub> per year. To achieve these savings goals, one of the requirements outlined in EU directives concerning the SES is the creation of Functional Airspace Blocks (FABs) in upper airspace. These must be designed in accordance with the operational requirements of air traffic, independently of national airspace boundaries. The faster potential FABs are checked for their viability and realized bindingly by the EU member states, the earlier the efficiency of European air traffic management can be increased. One such FAB project involves Germany, Belgium, France, Luxembourg, the Netherlands and Switzerland.

### Tax money wasted on micro-airports

Subsidy per passenger in euros\*



\*calculates 1 ton of freight as 10 passengers  
Source: Deutsches Verkehrsforum, DIW, ADV

### Subsidies

Another option for developing air transport sustainably is to limit the number of micro-airports. Most often, their infrastructure is created with state aid. However, subsidizing locations without demand jeopardizes the long-term economic and ecological viability of the entire air transport system. This conclusion is also reached in a study conducted by Deutsche Bank Research. Moreover, experts fear that the construction of further micro-airports could have a negative effect on Germany as a business location for the aviation industry. It is not only micro-airports that benefit from subsidies, though, but also airlines from prosperous non-European countries such as Japan, Australia and the Gulf states. The reason: Export credit guarantees allow them to buy aircraft in Europe and the USA at particularly favorable financing conditions and then to pass on this cost advantage to their passengers later on. On top of that, airlines from the Gulf states do not pay social contributions or corporate taxes and thus enjoy yet another competitive advantage.

### Hubs

A further issue of importance is the need to strengthen the competitive position of the German hubs in Frankfurt and Munich as well as, starting in 2011, the new major airport Berlin Brandenburg International. Increasingly, airlines from the USA and the Gulf states link the German economic regions with hubs outside of Europe. As a result, those passengers no longer connect at domestic hubs, but abroad. Such shifts in passenger flows mean that revenues, taxes and jobs are lost in Germany. Passengers often waste time, and airports in Germany lose the quality of their connections to other European hubs because their flights are less in demand. This is the case, for example, when American carriers – unlike Lufthansa – fly to destinations in the USA, such as Denver, not directly, but with a stopover in New York.

### Civil aviation treaties

Lufthansa hopes that the opening of the air transport market between Europe and the USA will provide a significant growth impulse. The first important step in that direction is the Open Skies Agreement concluded by the EU and the USA in March. It will allow EU carriers to fly from any EU country to the United States. Until now, they could do so only from their home country. They now also have the right to carry passengers from the USA to third countries. This gradual market liberalization benefits above all those passengers who would like to fly Lufthansa even when their trip to the USA does not begin in Germany. Lufthansa is confident that this first compromise will be the basis for additional agreements granting both sides the right to serve any route between the two economic regions – assuming the existence of balanced regulations concerning the environment, safety and subsidies. These are the topics for the second round of negotiations, which is to begin shortly and produce results by 2010.

### Noise protection

Surviving in international competition also requires a noise protection law that gives equal consideration to the needs of people living near airports and the interests of the aviation industry. The bill passed by both houses of the German parliament in February 2007 to revise the 1971 noise protection law is an acceptable compromise from Lufthansa's perspective. Those living around airports will benefit from significantly lowered noise limits, which will mean expanded daytime protection areas in regions surrounding airports. Additionally, legislators have designated nighttime



A Lufthansa Boeing 747-400 being towed into the noise protection hangar in Hamburg for a run-up.

protection zones which have been determined for the first time by means of factors including a single noise criterion. Moreover, any new construction or significant expansion of an airport must reckon with more stringent noise limits for all noise protection areas. Protection areas are now defined by applying an internationally accepted criterion (the equivalent continuous noise level  $L_{Aeq(3)}$ ) and by taking into account fluctuations in operating directions due to changing wind directions at airports. Both criteria entail an additional expansion of protection zones and thus improved noise protection for people living near airports. For the aviation industry, the new noise protection law means a more secure basis for planning, as the new, lower noise limits also apply to airport expansion projects. Lufthansa hopes that legislators will then pass the Noise Protection Law and the Instructions for the Calculation of Noise Protection Areas (AzB) soon after passing the new noise protection law.

### **Climate change – a global problem calls for global solutions**

The Earth's climate is changing. The dramatic consequences for world populations were evoked only recently by a climate report compiled by the United Nations' Intergovernmental Panel on Climate Change (IPCC) and by the Stern Report published in Great Britain. "The Earth has a fever," says former U.S. Vice President Al Gore, reducing this complex challenge to a common denominator and making it clear that climate change is a global problem. Global warming and the CO<sub>2</sub> burden thus require worldwide solutions. And this responsibility also applies to air transport, a globally active industry whose share of worldwide CO<sub>2</sub> emissions currently stands at 2.2 percent. (Air transport's share in anthropogenic greenhouse gas emissions worldwide is 1.6 percent; see also table on → page 17)

Lufthansa has advocated a lasting reduction of the environmental burden for many years. Accordingly, the specific fuel consumption of the Group's passenger fleets fell by 29.3 percent from 1991 to the end of 2006. Since 1999, EU carriers have improved their fuel efficiency by 20 to 25 percent. "We will continue to make our contribution in future," confirms Dr. Karlheinz Haag, Head of Group Environmental Concepts at Lufthansa. "What is needed here from our perspective is a comprehensive and balanced strategy. Rush jobs such as hastily introduced emissions trading for air transport in the EU have only very limited positive effects on the environment. For European airlines, however, such a solution would mean massive and lasting competitive disadvantages."

Air transport within Europe has only a 0.2-percent share in worldwide CO<sub>2</sub> emissions. An emissions rights trading system limited to European air transport, therefore, would only have a marginal ecological effect, while it can be expected to produce significant competitive distortions. Besides, there are numerous options that would be faster and more effective in achieving successful reductions of CO<sub>2</sub> emissions – with much less effort.

#### Air transport's share of anthropogenic greenhouse gas emissions, worldwide

		Source
Greenhouse gases, total <sup>1,2</sup>	1.6%	WRI <sup>3</sup>
CO <sub>2</sub> <sup>1</sup>	2.2%	DLR <sup>4</sup>

<sup>1</sup> anthropogenic

<sup>2</sup> listed in the Kyoto Protocol  
(CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, PFCs, HFCs, SF<sub>6</sub>)

<sup>3</sup> World Resources Institute

<sup>4</sup> German Aerospace Center (DLR)

For example, infrastructure improvements on the ground and in the air open up considerable reduction potentials with regard to CO<sub>2</sub>. Alone, the long-unrealized concept of unified European air traffic control, the Single European Sky, could immediately reduce CO<sub>2</sub> emissions in European air transport by 8 to 12 percent. "Here it is the politicians' job to create an appropriate framework of conditions," says Haag. Expanding key international hub airports would also help to further reduce unnecessary holding patterns.

Likewise, the technical progress in aircraft and engine construction creates additional possibilities for the reduction of fuel consumption and emissions. If Lufthansa did not modernize its fleet as planned, for example, it would theoretically emit an additional 1 million tons of CO<sub>2</sub> per year. And the use of alternative fuels might further reduce CO<sub>2</sub> emissions in the future (see article "When kerosene becomes scarce..." on → page 52).

Beyond that, improved operative measures also contribute to climate protection. Among these are more direct routings for long-haul flights. Without the current politically motivated "detours," Lufthansa alone would be able to conserve 7.5 tons of kerosene on each flight from Frankfurt to Beijing and back – and thus avoid about 23 tons of CO<sub>2</sub>. Once the CO<sub>2</sub> savings potential of these three pillars of climate protection has been exhausted, a trading system for emissions rights that includes air transport would be another option. Such a system must not be limited to the EU, however; rather it should be applied internationally.

For more information on the "Four pillars for climate protection" see → pages 60 to 62 in the article "Kerosene and emissions."

## Panorama

### Lufthansa is keen on pilots

At Lufthansa's Flight Training school in Bremen, all signs point toward growth: A total of 204 students started their training as commercial pilots in 2006 – significantly more than during the year before. This year, more than 240 training positions are available at the pilots' school of Lufthansa Flight Training (LFT). Aptitude tests are offered throughout the year in Hamburg. Selected students are then assigned to one of about ten courses per year. Lufthansa recruits its junior cockpit staff predominately from its own graduates. Should additional needs arise, Lufthansa also hires suitable candidates from other flight schools – provided they pass all their required exams. Detailed information is available at: → [www.lufthansa-pilot.de](http://www.lufthansa-pilot.de)



### New personnel marketing campaign

In 2006, the Group hired a total of 2,500 new employees. In 2007, Lufthansa will create as many as 3,000 new jobs – primarily in the service professions. To make sure that the “right” applicants are put into those jobs, the company launched a new personnel marketing campaign in fall 2006. Through spring 2007 Lufthansa ran advertisements in specialist journals and health-and-lifestyle magazines as well as on Internet pages and public billboards, all seeking qualified employees. The campaign was characterized by striking, innovative images that grabbed the viewers' attention: such as a glass perched on the armrest of an aircraft seat, or a child's forgotten toy that is begging to be reunited with its little owner, already aboard a flight. The online career portal [www.Be-Lufthansa.com](http://www.Be-Lufthansa.com), created in 2002, served as the advertising campaign's focal and pivotal point and is now used by more than 96 percent of all applicants for their first contact with the Lufthansa Group.



Could you get him on the next flight to Rome?

Be who you want to be  
Be-Lufthansa.com

### Training opportunities for deaf youngsters

2006 marked the fourth time that deaf young people started an apprenticeship as tool mechanics at Lufthansa Technik. In the course of their three-and-a-half year training, the hearing-impaired apprentices learn from scratch how to produce specialized tools, molds and templates. Additionally, they familiarize themselves with all important working techniques, such as machine and computer-controlled drilling, sawing, grinding, turning and milling. Given the high demand for qualified personnel in the aviation industry, these juniors will have excellent opportunities with regard to finding a job within the company. In 2006, a total of 182 young people started their professional careers at Lufthansa Technik. The number of apprenticeship positions has thus remained consistently high over the past years.

### Inauguration of the new Lufthansa Aviation Center

The “crane” has found a new nest: In July 2006, 1,800 Lufthansa employees moved into their new administration building, the Lufthansa Aviation Center (LAC). The use of glass as the dominant material underlines the Group's transparent, open corporate culture. The six-floor building offers state-of-the-art work stations as well as lots of space for creativity, development and communications. Designed by Dusseldorf-based architect Christoph Ingenhoven, the LAC is divided into ten “fingers” and nine gardens, all of which are covered by a roof resembling a paraglider. Thanks to a complex structure consisting of thermoactive exposed concrete ceilings, a sensitive automatic shading system, and a facade with highly-efficient thermal insulation, the LAC's energy consumption is expected to be only one-third of what it would be for a “conventional” office building. Above all, the gardens filled with plants from different climate zones have more than a purely esthetic function: Not only do they let a lot of natural light into the building, but they also act as climate and sound buffers between work areas and the airport, rail and highway surfaces surrounding the LAC. Lufthansa expects reliable data on the building's consumption values when the two-year optimization phase is concluded in 2008: Then the company will know exactly how much energy it saves each year thanks to the LAC's environmentally friendly design.



## Reconstruction of the Training Center Seeheim

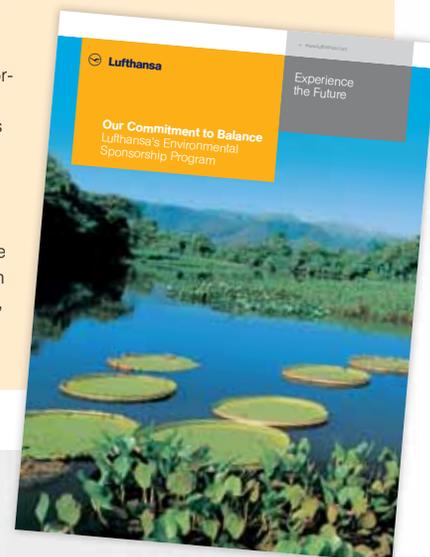
In April 2007, the starting signal was given for the reconstruction of Lufthansa's Training Center in Seeheim-Jugenheim near Frankfurt, which will have a surface of 67,000 square meters. By 2009 the company will have invested 100 million euros into the reconstruction of this historic venue for meetings involving Lufthansa employees from around the world. The new building is convincing not only from an ecological perspective, but also for its advanced architecture emphasizing lightness, transparency and clear order. The concept of this modern glass building provides for two staggered L-shaped buildings, which blend into the landscape of the Odenwald nature reserve through a series of terraces. Large glass surfaces allow free views of nature and underline the training center's goal of allowing its visitors new insights and outlooks at all times. The new building will be available to other companies as well as individuals as a conference hotel. Visitors may choose from 483 rooms in different categories, including barrier-free rooms for people with disabilities.

For more information on the low-energy concept of the Training Center Seeheim, turn to the article "Training Center Seeheim: Saving energy with geothermal energy" on → page 65.



## New environmental brochure

Comprehensive and entertaining – that's the approach a new brochure published by the Lufthansa Environmental Sponsorship Program takes to inform readers about the Group's commitment in the area of environmental and species protection. The richly illustrated publication "Our Commitment to Balance – Lufthansa's Environmental Sponsorship Program" focuses on the activities to protect the crane – Lufthansa's heraldic bird. On 23 pages, readers learn interesting facts about efforts such as those undertaken by the Working Group Crane Protection Germany, of which Lufthansa was a cofounder in 1991. Ever since, the working group has helped – among other things – to conserve the important breeding and resting grounds of the Eurasian crane in Germany. Other topics are the international lake network "Living Lakes," which Lufthansa cosponsors, the model project Rainforestation Farming on the island of Leyte in the Philippines and the "Convention on the Conservation of Migratory Species of Wild Animals" (CMS), which supports the survival of migratory species worldwide. An overview map showing the migration routes, breeding and wintering areas of all 15 crane species rounds off the brochure, which can be ordered at <http://responsibility.lufthansa.com>



## Fit while working shifts

"Rested and Alert" is an interdisciplinary project that Lufthansa has developed jointly with the German Aerospace Center (DLR). Involved in its design were Lufthansa's aircraft maintenance as well as the airline's staff council, the initiative "More than a Job" and Medical Services. The goal of the new "Alertness Management Training" is to ensure that the 3,000 Lufthansa technicians working shifts remain fit for their work at night. Thus, shift workers learn in the course of two 90-minute trainings how to stay healthy and physically fit long-term despite a lifestyle that goes against their internal clocks. Lectures, brochures, group work and keeping a sleep log help technicians to develop strategies for dealing positively with tiredness at night, lack of sleep and the results of shifted biorhythms. Flight attendants and pilots also benefit from these "tips and tricks" as they too work in shifts and regularly cross time zones.

## Our business

# A fleet for the future

Lufthansa is growing in sustainable and profitable ways. Important pillars for this growth are value-creating investments and long-term cost reductions. In both of these areas, a forward-looking, responsible fleet policy makes an important contribution.



**People are becoming more and more mobile**, and air transport in particular must take this development into account. Despite the high price of crude oil and the discomforts due to tightened security procedures, air transport has increased by almost 30 percent since 2000. The growth rate of 14 percent in 2004 was the highest of the last 25 years. And the outlook continues to be positive: Projections published by aircraft manufacturer Airbus assume that worldwide passenger traffic will increase by 4.8 percent per year until 2025. Furthermore, the company expects that the number of passenger aircraft in operation will more than double by 2025 – as will the frequencies offered on individual routes.

Asia is of particular interest in this context. Based on the number of connections, Lufthansa is already the region's leading European carrier. However, there are still many growth opportunities on other continents as well: While Europe and the USA currently account for only 13 percent of the world's population, they generate 70 percent of global air traffic. These figures illustrate the enormous growth potential the many young, up-and-coming regions around the world hold for the aviation industry.

#### The A380 – significantly below the emissions limits

The International Civil Aviation Organization (ICAO) has given the airlines demanding limits regarding the emissions of their aircraft. Lufthansa's new flagship, the Airbus A380, will operate clearly below these maximum values: For nitrogen oxides, the wide-body jet is 31 percent below the limits; for unburned hydrocarbons and carbon monoxide, it is even 62 percent below.

That Lufthansa is well positioned in these markets of the future was substantiated impressively by its successful financial years 2005 and 2006. And the airline's room for growth is far from being exhausted. "In light of these perspectives, Lufthansa has launched a comprehensive fleet modernization program," says Nico Buchholz, Senior Vice President Corporate Fleet. "In this way, we are creating an excellent foundation on which we can consolidate and expand our leading position on intercontinental routes." The fleet's modernization and expansion must strike a balance between future traffic levels and customer preferences on the one hand and ecological and economic aspects on the other.

#### The fleet – a key pillar for any airline

A modern, well structured fleet is a key pillar for any service- and market-oriented airline. When modernizing and expanding its existing fleet, an airline has to take many factors into account: It has to adapt the numbers and sizes of aircraft to expected traffic volumes. The fleet should also be homogeneous, but still provide different aircraft sizes to allow flexible reactions to the market's changing demands at any time. Moreover, the aircraft in the fleet should be aligned optimally with customer preferences, while taking the all-important aspects of economic efficiency and ecological compatibility into account.

The strategic decisions made in the context of fleet policy gain particular significance by virtue of their durability: With the acquisition of an aircraft, the airline makes a firm commitment for the next 15 to 25 years. Against this background, the expected costs for operations and maintenance play a decisive role when selecting a type of aircraft.

"Lufthansa is one of the most innovative airlines. Our fleet policy underpins Lufthansa's commitment to customer orientation and profitable growth, as well as its carefulness and seriousness with respect to sustainability and the environment," says Buchholz. "When buying new aircraft, we always pay particular attention to lowest-possible fuel consumption, operating costs and noise

15 firm orders for Airbus A380s make Lufthansa the largest A380 airline in Europe. With an expected fuel consumption of only 3.4 liters per 100 passenger kilometers, this aircraft sets new standards.



emissions. So the aircraft we have just ordered will allow us to further reduce the average fuel consumption and emissions of our long-haul fleet.”

In 2006, the Supervisory Board approved orders for a total of 62 new aircraft: 30 new short- and medium-haul aircraft – five Airbus A319s, ten Airbus A320s and 15 Airbus A321s – which will be delivered starting in 2007. At the same time, Lufthansa secured the framework for a further renewal involving 30 more aircraft in this segment. To expand its long-haul fleet, Lufthansa is set to receive seven Airbus A340-600s and five Airbus A330-300s, starting in 2008. And from 2010, 20 new Boeing 747-8s will complement the long-haul fleet. With these newly ordered planes, Lufthansa is making great strides toward its goal of operating the “3-liter aircraft.”

A further component of the fleet modernization program are the 15 Airbus A380s ordered in 2001, which Lufthansa will receive step-by-step starting in 2009. “Each and every aircraft ordered in 2001 and 2006 demonstrates that Lufthansa acts in a sustainable manner,” Buchholz emphasizes. “To cite but one example: The A340-600 is one of the quietest aircraft ever, both inside and outside the cabin.”

### **The Boeing 747-8 – the optimum addition to Lufthansa’s fleet**

Lufthansa will be the first airline worldwide to operate the new Boeing 747-8. “The Boeing 747-8 is the ideal addition to the Lufthansa fleet,” explains Buchholz. “It closes the gap between the Airbus A340-600 with just over 300 seats and the Airbus A380 with over 500 seats.” By cooperating with the manufacturer, Lufthansa has ensured that the new Boeing will feature many efficient and practical innovations: more space for passengers,

Highest economic efficiency, lower consumption of resources and noise emissions far below all limits: Lufthansa has ordered 20 of the state-of-the-art wide-body Boeing 747-8 aircraft.



#### **Nico Buchholz, Senior Vice President Corporate Fleet, being interviewed:**

##### **What are your department’s tasks?**

Nico Buchholz: We’re responsible for fleet strategy and aircraft evaluation at Lufthansa, and we prepare acquisitions and sales of aircraft. In coordination with the planning and distribution organizations of the airlines under the roof of the Lufthansa Group, we make sure that the right airplanes are in our fleet at the right time, so that we can meet our customers’ needs and achieve profitable growth. In addition, we cooperate closely with aircraft and engine manufacturers to help develop aircraft that fit Lufthansa’s specific needs.

##### **What factors do you need to consider when buying aircraft?**

Our fleet strategy is closely linked to the current and, above all, to the future market situation. A key aspect is the expected traffic volume. At the same time, we attempt to predict our customers’ wishes. Of course, the decision-making process includes ecological and economic factors, which are not opposing interests for Lufthansa. As kerosene is one of the largest cost items for airlines, we automatically pay attention to buying aircraft that are as fuel-efficient as possible.

##### **What role does price play in the acquisition of aircraft?**

Often people ask about the purchase price when Lufthansa orders new aircraft. But from an economic perspective, an aircraft’s operating costs are at least as important, as these are incurred over the aircraft’s entire life span. And that’s usually 15 to 20 years. This is why we need to pay special attention to these costs when making a purchase decision.

improved wings, new engines, lower fuel consumption, lower noise emissions, increased range and an improved cabin interior.

Lufthansa will equip its 20 Boeing 747-8s with new General Electric engines, which are expected to bring the aircraft’s fuel consumption down to as little as 3.5 liters of kerosene per 100 passenger kilometers. “And the B 747-8’s noise imprint is even 30 percent smaller than that of the B 747-400,” says Buchholz. Aerodynamics have been improved significantly thanks to curved wings and a 4-meter increase in wingspan compared with its predecessor. Lufthansa is also expecting significant reductions with regard to maintenance costs: They will be about 25 percent lower for the B 747-8 than for the B 747-400. And the airline can use a major part of the existing infrastructure on the ground for the new aircraft.

### **The Airbus A380 – the new dimensions of flying**

Lufthansa’s new flagship on long-haul routes will be the Airbus A380, as this wide-body aircraft represents the new dimensions of flying. For Lufthansa, the next chapter in the history of aviation begins with the A380. “This new wide-body aircraft will allow us



growth where there are limits today. It will bring new dimensions of quality for our passengers; at the same time, it will significantly improve economic efficiency and our environmental balance sheet," says Buchholz.

Lufthansa plans to operate its A380 fleet above all on highly frequented routes to North America and Asia, and so far has earmarked about 20 potential destinations. These places all have one thing in common: Passenger demand is already so strong there today that the available capacities on a Boeing 747 or an aircraft of the Airbus A340 family no longer suffice. And the forecasts call for further increases in demand. This trend is contrasted, however, by restrictions in traffic rights and airport capacities. "With over 500 passengers, the A380 carries a lot more on board than a Boeing 747. Therefore, this Airbus offers Lufthansa the unique opportunity to grow at many large international airports despite slot restrictions and limited landing rights," Buchholz explains.

Yet this growth will not burden the environment in equal measure: The Lufthansa Airbus A380 sets new standards for the environ-

"These new wide-body aircraft allow us growth where there are limits today. At the same time, they improve economic efficiency and our environmental balance sheet."

Nico Buchholz, Senior Vice President Corporate Fleet



mental compatibility of passenger aircraft. This long-haul aircraft flies more fuel-efficiently than any other. It is expected that the A380 will consume only 3.4 liters of kerosene per 100 passenger kilometers. One reason for this is it weighs less: Airbus uses innovative materials for the construction of this entirely newly developed aircraft, saving more than 15 tons of weight. And lower fuel burn means not only lower costs but also lower emissions (see insert "The A380 – significantly below the emissions limits" on → page 21).



The aircraft ordered in 2006 will allow Lufthansa to further reduce the average fuel consumption and related emissions of its long-haul fleets.

Moreover, the Lufthansa Airbus A380 will be equipped with the most advanced engines currently available on the market. Thanks to the state-of-the-art Rolls-Royce Trent 900 engines and other aerodynamic improvements, the A380's noise imprint is about one-third smaller than that of the long-haul aircraft Boeing 747-400. "The Airbus A380 is the flying symbol of responsible use of scarce resources," summarizes Buchholz.

#### **Preparations for the A380 continue**

The preparations for operating the A380 from summer 2009 are progressing according to schedule at Lufthansa. During evacuation tests in Hamburg in spring 2006 as part of the required certification process, a Lufthansa crew ensured that all passengers and crew members left the aircraft in record time. Further

#### **A regional high-flyer – the Bombardier CRJ900**

Lufthansa sets new standards with its fleet modernization, even beyond the long-haul segment. The state-of-the-art regional jet Bombardier CRJ900 has reinforced the fleet of regional subsidiary Lufthansa CityLine since summer 2006. Currently, 12 of these 84-seater aircraft fly daily on European routes. In addition, Lufthansa CityLine's fleet comprises 18 Avro RJ85s, 20 Bombardier CRJ700s and about 26 Bombardier CRJ200s. The last-named aircraft type from Canada convinces above all from an environmental perspective: It is considered the world's quietest commercial aircraft. Outside an airport's perimeter fence, a Bombardier CRJ taking off is usually not louder than a car passing by in traffic. Another distinguishing characteristic of the Bombardier jet is its ability to fly at high altitudes. In everyday flight operations it climbs to an altitude of 12,500 meters; in the Lufthansa fleet, only the Boeing 747 flies higher. The lower air resistance at high cruising altitudes again helps to reduce fuel consumption.

tests followed in the context of so-called "route proving flights": Lufthansa was the exclusive Route Proving Partner of Airbus in March 2007, when the A380 proved its qualitative and operative characteristics for the first time under the realistic conditions of several scheduled flights. The A380 flew from Frankfurt to New York, Hong Kong, Washington and Munich. At the Frankfurt



hub, Lufthansa simultaneously tested its infrastructure on the ground. Successfully so: To handle an A380, ground staff needed the same turnaround time as for significantly smaller long-haul aircraft.

Safety is an important promise of the Lufthansa brand. Consequently, Lufthansa Flight Training is investing a two-digit million euro amount in its own Airbus A380 simulator. There, Lufthansa will train not only its own pilots from early 2008 but also the future A380 pilots of other carriers. The simulator allows pilots to replicate a broad range of flight situations under realistic conditions.

#### The right aircraft for every route

Just how far-sighted Lufthansa has always been in assembling its fleet is demonstrated by the fact that it has the right aircraft for every type of demand. This allows Lufthansa to plan its internal processes better and makes it considerably more flexible in everyday operations. And this, in turn, helps the airline to achieve the optimum load for each flight. "In this way, Lufthansa is able to reduce its specific fuel consumption even further, increase its profitability and further improve its efficiency in environmental care," Buchholz emphasizes.

#### 45 new aircraft for the regional fleet

Lufthansa further strengthens its advanced, efficient regional fleet: On April 17, 2007, the Supervisory Board approved the purchase of 45 new short-haul aircraft. From the end of 2008, Lufthansa will take delivery of 15 Bombardier CRJ900s and 30 regional aircraft of the Embraer 190 family. These aircraft distinguish themselves by high fuel efficiency, low emissions values and limited noise burdens (see also "A regional high-flyer – the Bombardier CRJ900" on → page 24).

Yet sustainability embraces not only ecological but also economic and social aspects. And that includes the creation of new jobs. "The Airbus A380 is a flying job engine," Buchholz stresses. Each of these 15 wide-body aircraft on order means employment for 400 people at Lufthansa – in the cockpit, cabin, maintenance, catering, operations and operations planning.

#### Lufthansa in an optimum position for growth

Air traffic grows both as a result of route network expansions and between hubs. For example, experts project that there will be a total of about 300 routes between Europe and Asia in 2025, 51 of which will interconnect hub locations. More than half the passenger volume, however, will be handled on these hub-to-hub routes.

#### Lufthansa's network concept

The "hub-and-spoke" network concept means that Lufthansa long-haul flights are offered in concentration from its hubs in Frankfurt, Munich and Zurich. The reason for this approach is that it is not efficient to link all airports with all desired destinations by means of direct flights. Instead, feeder flights take passengers to hub airports, from which their connecting flights depart. As arrival and departure times are optimally coordinated within this system, transfer times can be reduced to a minimum, which significantly reduces passengers' total travel time.

The network concept allows Lufthansa to offer its customers a greater number of connections while improving its ecological balance sheet. The reason: With this concept, Lufthansa needs altogether fewer flights on larger – and thus more efficient – aircraft than would be possible with direct connections.

At the beginning of the 21st century, Lufthansa is in an optimum starting position with its new long-haul fleet to take advantage of market developments and to grow profitably and sustainably. Nico Buchholz points to the reason: "The backbone of Lufthansa's growth track is the interaction between our network concept and our strategic fleet policy. For example, our new flagship, the Airbus A380, is the ideal aircraft for increasing hub-to-hub traffic. Our strategic fleet policy ensures that we're always in a position to operate the most efficient type of aircraft in any demand situation." ●

## Business segments

Passenger Transportation 2006		changes compared to 2005
<b>Revenue</b>	13,475 million €	+ 11.9%
<b>Operating result</b>	409 million €	+ 203.0%
<b>Number of employees on Dec. 31</b>	38,410	+ 3.7%



Logistics 2006		changes compared to 2005
<b>Revenue</b>	2,845 million €	+ 3.4%
<b>Operating result</b>	82 million €	- 24.1%
<b>Number of employees on Dec. 31</b>	4,600	- 2.2%



Maintenance, Repair and Overhaul (MRO) 2006		changes compared to 2005
<b>Revenue</b>	3,415 million €	+ 9.4%
<b>Operating result</b>	248 million €	- 3.9%
<b>Number of employees on Dec. 31</b>	18,426	+ 3.1%



## Bundled competence

Deutsche Lufthansa AG is one of the world's leading air transport companies, with more than 400 Group and affiliated companies. The company is active in five business segments – six until the end of 2006. Its core business is Passenger Transportation; further business segments are Logistics, MRO (Maintenance, Repair and Overhaul), Catering and IT Services. In December 2006, Lufthansa reached an agreement to sell its share in the tourism group Thomas Cook to KarstadtQuelle.

### Business segment Passenger Transportation

Lufthansa's core business segment is Passenger Transportation, and Lufthansa Passenger Airline is one of the leading carriers worldwide. Together with its Lufthansa Regional partners, it offers a comprehensive product portfolio. Lufthansa's image is characterized by quality, safety, reliability and innovation. Its offer ranges from attractively priced flights with more restrictive conditions to premium products with flexible booking options and all-round personal service. In July 2005, Lufthansa set the course for a linkup with Switzerland-based quality carrier SWISS, whose integration is to be completed in 2007. In international air transport, Lufthansa carries the most passengers of all IATA (International Air Transport Association) members. Lufthansa is a founding member of the leading airline association Star Alliance. Beyond that, it maintains partnerships with other airlines. On December 31, 2006, the airline's Passenger Transportation fleet comprised 411 aircraft. In the summer timetable 2006, these aircraft flew to 188 cities in 77 countries. The company is managed by a five-member Group Company Executive Board and has its headquarters in Frankfurt.  
→ [www.lufthansa.com](http://www.lufthansa.com)

### Business segment Logistics

Lufthansa Cargo AG is one of the world's largest freight carriers. Within the Lufthansa Group, it handles the freight business – using a fleet of 19 MD-11F aircraft. Additional capacities are chartered as the need arises. The wholly-owned Lufthansa subsidiary offers both its own cargo services and the freight capacities on Lufthansa passenger aircraft. Via its subsidiary cargo counts, the logistics specialist also markets the cargo capacities of Condor, SunExpress, euroAtlantic, Viva Macau and Croatia Airlines. The route network of Lufthansa Cargo includes more than 500 destinations, which are served by freight and passenger aircraft as well as trucks. The business segment Logistics also comprises the Lufthansa Cargo Charter Agency GmbH, Jettainer GmbH, handling counts GmbH and time:matters Holding GmbH. The cargo carrier has its headquarters in Kelsterbach, near Frankfurt.  
→ [www.lufthansa-cargo.com](http://www.lufthansa-cargo.com)

### Business segment Maintenance, Repair and Overhaul (MRO)

Lufthansa Technik AG is one of the world's leading providers of technical aircraft services. Worldwide, 580 customers – including airlines, operators of VIP jets and aircraft leasing companies – trust the Group company's expertise in the maintenance, repair and overhaul of commercial aircraft. Thanks to its broad range of services and innovative products, Lufthansa Technik gained 48 new customers in 2006. In 1996, the aircraft maintenance company was the first in its industry to be certified according to the EU eco-audit regulations. The company has its headquarters in Hamburg and is divided into six product divisions: Maintenance, Overhaul, Engines, Components, Landing Gear and VIP Jets.  
→ [www.lufthansa-technik.com](http://www.lufthansa-technik.com)

<b>IT Services</b> 2006		changes compared to 2005
<b>Revenue</b>	652 million €	+2.7%
<b>Operating result</b>	49 million €	-22.2%
<b>Number of employees on Dec. 31</b>	3,321	+0.9%



<b>Catering</b> 2006		changes compared to 2005
<b>Revenue</b>	2,278 million €	+2.8%
<b>Operating result</b>	50 million €	+900.0%
<b>Number of employees on Dec. 31</b>	28,555	+0.9%



### Business segment IT Services

Lufthansa Systems AG is one of the world's leading IT service providers for the airline and aviation industry. The company specializes in planning, developing and implementing individual software solutions. Additionally, Lufthansa Systems offers companies from other industries – such as finance, media or logistics – the option of outsourcing their technical infrastructure. By developing comprehensive IT platforms depicting customer processes on the ground and in the air in their entirety, the company further consolidated its favorable market position in 2006. Lufthansa Systems has locations in Germany and 15 representatives abroad. The portfolio of the full-service provider comprises the divisions Airline Management Solutions, Passenger Airline Solutions, Airline Operations Solutions, Industry Solutions and Infrastructure Services. Lufthansa Systems has its headquarters in Kelsterbach near Frankfurt.  
→ [www.LHsystems.com](http://www.LHsystems.com)

### Business segment Catering

With a market share of 30 percent, LSG Sky Chefs confirmed its position as the worldwide leading airline caterer and partner for in-flight management solutions in 2006. The Group company comprises 140 subsidiaries with 190 operational locations and production facilities at airports in 49 countries. In addition to providing on-board services for 270 airlines, the Group operates airport restaurants, supplies airport lounges and has retail outlets at German airports. The strict quality standards of LSG Sky Chefs serve as a model and benchmark for the entire catering industry. LSG Sky Chefs has evolved from a pure catering service company to a full-service provider of services related to in-flight management. In 2006, LSG Sky Chefs received the award “Caterer of the Year” from the leading German trade journal “Catering Inside” for its industry-leading concepts. The company has its headquarters in Neu-Isenburg near Frankfurt.  
→ [www.lsgskychefs.com](http://www.lsgskychefs.com)

### Lufthansa service and financial companies

The Lufthansa Group complements its strategic business segments with service companies in the finance and service sector. These include the Lufthansa Commercial Holding GmbH (LCH) with headquarters in Cologne, Lufthansa AirPlus Servicekarten GmbH in Neu-Isenburg, Lufthansa Flight Training GmbH in Frankfurt and financial companies including Delvag Luftfahrtversicherungs-AG, Albatros Versicherungsdienste GmbH and Delvag Rückversicherungs-AG.

### Thomas Cook AG

Thomas Cook is one of the world's leading touristic groups with 2,400 travel agencies, 80 aircraft and more than 33 tour operator brands – including Neckermann and Thomas Cook Travel. Customers benefit from a wide range of tailor-made package tours, components and services. In December 2006, Lufthansa reached an agreement to sell its 50-percent share in Thomas Cook to KarstadtQuelle. The business segment Leisure Travel has thus been sold in accordance with the Supervisory Board's decision of March 7, 2007 and the release by the antitrust authorities of March 26, 2007. Simultaneously, Lufthansa has increased its share in Condor from 10 to 24.9 percent. The agreement also provides that Lufthansa receive the shares that Condor held in SunExpress. Lufthansa plans to further expand the position of the leading carrier for travel to Turkey together with Turkish Airlines, the other shareholder.

## SWISS The environment is also on board

SWISS is gaining altitude: In 2006, the Swiss carrier was in the black for the first time, following its successful restructuring.

### Lufthansa and SWISS

After securing the necessary traffic rights, Deutsche Lufthansa AG acquired all the remaining shares in Swiss International Air Lines AG. Effective July 1, 2007, Lufthansa holds all the equity in SWISS through Air-Trust, which is domiciled in Switzerland. This feature gives an overview of the environmental efficiency at SWISS.

In 2006, Swiss International Air Lines achieved its turnaround and began gaining altitude. Three factors made this possible: First, measures to improve the airline's cost structure were successfully implemented. Second, SWISS benefited decisively from its cooperation with Lufthansa, and the resulting synergies could be realized sooner and more comprehensively than originally planned. Third, the positive economic environment provided additional lift. Building on such solid foundations, growth is now possible again. The load factor rose more rapidly than the capacities offered, so specific emissions declined – for all aircraft types.

This balance between economic and ecological factors is anchored in SWISS's binding company guidelines. Thus, the airline has committed itself to profitable and sustainable growth; furthermore, setting a responsible course in environmental protection has become a declared corporate goal. This harmony between economic and sustainable aspects can be illustrated by the example of fuel costs: From 2003 to 2006, their share in the airline's total operating costs rose from 12.5 to over 22 percent. So the expressed economic goal of cutting costs matches the ecological goal of cutting fuel consumption and related emissions.

### SWISS fleet

Number and age (in years) on 31.12.2006

Type	number	age
<b>A340</b>	9	3.0
<b>A330</b>	11	7.3
<b>A319</b>	7	9.6
<b>A320</b>	15	8.8
<b>A321</b>	4	9.2
<b>Avro RJ85</b>	4	13.6
<b>Avro RJ100</b>	20	8.9
<b>Total fleet</b>	70	8.2

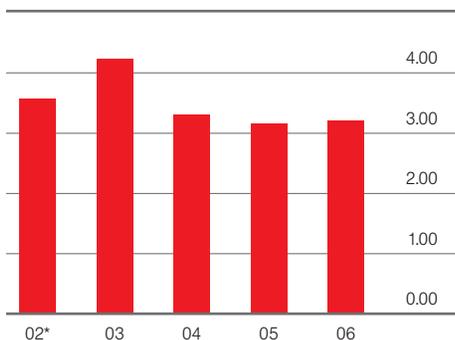
### Investments in the fleet pay off

SWISS operates a versatile and modern fleet. Over the past years, the airline has invested particularly in its long-haul fleet and replaced its MD-11 aircraft with significantly more efficient Airbus A340s. Alone, the switch from the MD-11 to the A340 cuts SWISS's kerosene consumption by about 11 percent a year and avoids about 100,000 tons of CO<sub>2</sub> emissions. This corresponds to total CO<sub>2</sub> emissions from about 1,200 long-haul flights.

Before each flight, a sophisticated fuel management system analyzes current data on the weather, traffic, winds, routes and load situation. Based on this information and data from past flights, the system projects a quantity of kerosene that fits the situation of the forthcoming flight as accurately as possible. In this way, it assists the pilots in determining the suitable quantity of fuel to be filled into the aircraft's tanks. In the air, another system continuously determines the aircraft's center of gravity and makes corrections by pumping fuel from one tank to another. A simple figure shows how important it is to carry only as much fuel as will be needed: Just carrying 1 ton of fuel on a long-haul flight takes about 300 kilograms of kerosene.



**CO<sub>2</sub> emissions of the SWISS fleet**  
in million tons

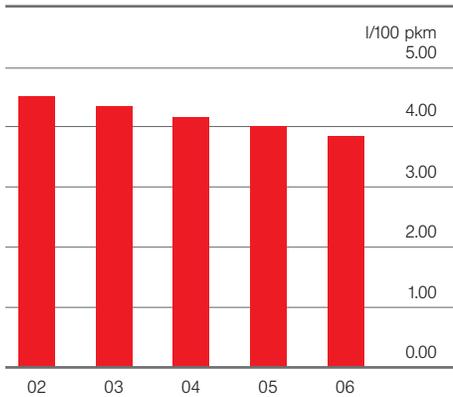


\* in 2002, measurements from April to December only.

SWISS also saves additional weight by means of more lightweight seats. On its Airbus A320s, the airline has already replaced conventional models with high-tech seats made from carbon fiber. The result: SWISS carries less weight, has improved passenger comfort and has even increased the number of seats available on its aircraft. Economic and ecological improvements go hand in hand in this case. In the wake of this positive experience, the airline's 4 Avro RJ85s, 20 Avro RJ100s and its remaining Airbus short-haul aircraft (13 A319s and A321s) will also be refitted accordingly. For the 29 Airbus aircraft, this means an average avoidance of about 300 tons of CO<sub>2</sub> and 140 kilograms of NO<sub>x</sub> (nitrogen oxides) per aircraft and year. The additional seats on the aircraft also contribute to further reducing specific emissions.

In daily flight operations as well there are guidelines that help conserve kerosene. For example, SWISS pilots flying on European routes are encouraged not to fly at maximum speed during a flight's cruising phase. And during the take-off phase, they already accelerate the aircraft at an altitude of 1,500 instead of 3,000 feet above the runway. This way, they can reduce sooner the fuel-guzzling resistance of the high-lift devices, which are needed for takeoff. Moreover, "cost-index flight planning" allows pilots to optimally adapt the aircraft's speed to variable winds at high altitude.

**Kerosene consumption per 100 passenger kilometers**  
100 kg of freight = 1 passenger



**General conditions cause savings effects to go up in smoke**

Many reduction efforts are simply wiped out by political constraints, however. Like all European airlines, SWISS burns significant quantities of fuel in holding patterns and by flying inefficient detours as a unified European air traffic control system does not yet exist. Particularly important for the SWISS home base are the restrictions on early-morning approaches. Accordingly, long-haul aircraft arriving early due to favorable meteorological conditions are forced to waste the time and kerosene thus saved by flying in holding patterns. Inflexible regulations do not allow landings before 6 a.m. in such cases. The additional fuel burn caused in this way corresponds roughly to the quantity of kerosene the airline conserves by having switched from the MD-11 to the A340.

SWISS sets new standards with regard to avoiding noise: While an A340 with four engines climbs less steeply than a three-engine MD-11, the noise measured on the ground (maximum level) is not greater. That means the A340's modern engines are designed not only for fuel efficiency but also for appreciably lower noise emissions. This has also been confirmed by measurements conducted by EMPA, Switzerland's Materials Science and Technology Institute.

SWISS will continue its efforts to lower fuel consumption and specific emissions in future. An initial step was already made in 2006: As emissions rose markedly less than production, the airline has begun to decouple its production growth from the related environmental effects. And efforts for further steps have already begun.

## Transport performance

**Passenger transportation** changes compared to 2005

<b>Passengers</b>	68,060,661	+ 4.2%
<b>Performance offered SKO</b>	191,115 million pkm	+ 2.0%
<b>Performance achieved PKT</b>	158,284 million pkm	+ 2.0%
<b>Seat load factor</b>	82.8 percent	- 0.1 %pts.

**Freight transport** changes compared to 2005

<b>Freight carried</b>	1,758,968 tons	+ 1.3%
<b>Performance offered FTKO</b>	11,717 million tkm	+ 4.5%
<b>Performance achieved FTKT</b>	7,637 million tkm	+ 8.3%
<b>Freight load factor</b>	65.2 percent	+ 2.3 %pts.

**Total** changes compared to 2005

<b>Flights</b>	735,072	+ 2.8%
<b>Performance offered TKO</b>	30,430 million tkm	+ 3.1%
<b>Performance achieved TKT</b>	23,254 million tkm	+ 4.0%
<b>Payload factor</b>	76.4 percent	+ 0.8 %pts.

## Lufthansa sets a new passenger record

In 2006, Lufthansa Passenger Airline and its regional partners carried more passengers than ever before in the company's history: Together, they flew 53.4 million people to their destinations, 4.2 percent more than in the preceding year. Including Thomas Cook, this even amounted to 68.1 million passengers. Moreover, the Lufthansa Passenger Airlines jointly carried more passengers in international air transport than any other airline in the International Air Transport Association (IATA). Thus, Lufthansa further expanded its position as one of the world's leading airlines. At 82.8 percent, the seat-load factor remained almost unchanged at the high level of the previous year.<sup>1</sup> Lufthansa achieved the most pronounced increases in demand within Europe and on flights to and from Asia.

### betterFly concept gives lift to European business

In the traffic region Europe including Germany, Lufthansa carried 41.5 million passengers, an increase of 5.2 percent over the preceding year. While capacities rose by 6.6 percent, sales increased by 8.1 percent. The seat load factor improved by 0.9 percentage points to 65.4 percent. Several factors contributed to this success: expanding the routes to Eastern Europe to 24 cities, the robust economic climate in Germany and the expansion of the betterFly concept, which was well received in the market. betterFly allows Lufthansa customers to fly within Europe for only 99 euros – including taxes and fees. The offer is valid on Lufthansa nonstop flights from all German cities to destinations in the member countries of the European Union, Switzerland, Norway and Turkey. In addition, passengers receive miles in the Miles & More Program and enjoy the usual high levels of service typical for all Lufthansa flights.

In the traffic region the Americas, Lufthansa further optimized its route capacity: To improve the passenger mix, the airline reduced its capacities on those routes with a high share of touristic traffic – particularly to South America – in favor of routes to North America and Asia. On routes to North America, Lufthansa expanded its capacity by 1 percent while the number of passengers carried remained stable at 5.4 million. The seat-load factor, at 80.5 percent, nearly matched the previous year's high level.

In the traffic region Asia/Pacific, the airline carried 4 million passengers, 5.9 percent more than in the previous year. Specifically, Lufthansa has expanded its China program and increased frequencies to Beijing, Shanghai and Hong Kong to meet growing demand. Capacity grew by 3.1 percent in 2006, and sales by 4.6 percent. Concurrently, the seat-load factor increased by 1.1 percentage points to 80.6 percent.

In freight transport, Lufthansa Cargo benefited from the improving economy and outpaced the market's growth rate. Despite intense competition, particularly in the German market, the logistics company increased its cargo volume by 1.3 percent to 1.76 million tons of freight and mail. In the USA, capacity decreased by 5.7 percent, partly due to the termination of a cooperation agreement with US Airways. By contrast, capacity in the traffic area Asia/Pacific increased by 4.4 percent, and sales even increased by 6.9 percent.

<sup>1</sup> The seat load factor shown here deviates from the data shown in the Lufthansa Annual Report. See also section "About this report" on → page 5.

**Difficult general conditions**

Lufthansa increased its transport performance despite difficult general conditions. In the wake of dramatic rises during the preceding years, the prices for crude oil and jet fuel reached new record levels in summer 2006. Thus, the price for crude oil climbed to the record price of US\$ 78.40 per barrel in July. And kerosene cost approximately US\$ 742 per ton, or 26 percent more than in the previous year. Even though prices receded again during the fourth quarter, a ton of kerosene still cost US\$ 591 at the end of December.

## **Fleet** **Investments secure top position in international air transport**

Lufthansa continuously invests in its fleet to consolidate its top position in international air transport. New aircraft increase efficiency, lower fuel consumption and operating costs, and lessen the burden on the environment (see also article "A fleet for the future" on → page 20). In 2006 alone, the airline put 18 new aircraft into service. As the delivery of the 15 Airbus A380s ordered in 2001 has been delayed, Lufthansa ordered five Airbus A330-300s and seven Airbus A340-600s, which will close the gap from summer 2008. In this way, the airline avoids capacity bottlenecks due to this delay in delivery as air traffic continues to grow.

The Lufthansa Group fleet comprised 430 aircraft on December 31, 2006. It includes the aircraft of Lufthansa Passenger Airline, those of the regional partners Lufthansa CityLine, Air Dolomiti and Eurowings, as well as those of Germanwings and Lufthansa Cargo. However, of relevance for the environmental balance sheet is the total number of aircraft in operation across the Group. At the end of the year, this total came to 497 aircraft (see also table "Group fleet" on → page 33).

In the summer timetable 2007 of Lufthansa Passenger Airlines, Lufthansa aircraft fly to more cities than ever before: 192 destinations in 78 countries. A year earlier, this was 188 destinations in 77 countries. A total of 13,700 Lufthansa flights are scheduled per week, of which 5,584 take off or land in Frankfurt. Munich, with 5,046 aircraft movements, is Lufthansa's second-largest hub. Together, these hubs handle almost 78 percent of all Lufthansa flights. Statistically speaking, a Lufthansa aircraft takes off every 43 seconds somewhere in the world – or every six seconds, if all Star Alliance partners are taken into account.

## **Hub management** **Multi-hub – the basis for further growth**

In 2006, Lufthansa evolved its hub and network management decisively: With its multi-hub strategy, the airline promotes entrepreneurial responsibility within the Group and simultaneously creates the basis for its future growth track. In the framework of this strategy, Lufthansa strengthens its hubs in Munich and Frankfurt by firmly assigning specific parts of the fleet to these locations and by giving local management increased operational and economic responsibility. The goal is to align network management even more clearly with market needs.

"We combine the resources and advantages of a large company with the quickness, flexibility and clarity of a medium-sized company. This makes us more customer-

**Group fleet<sup>1</sup>**

on 31.12.2006

(changes compared to 2005)

	in possession <sup>2</sup>			in operation <sup>3</sup>		
	number		age	number		age
Lufthansa Passenger Airline	259	(+ 4)	12.0 (+0.9)	238	(+ 7)	12.1 (+ 0.9)
Lufthansa CityLine	79	(- 1)	7.0 (- 1.0)	76	(- 4)	6.7 (- 1.2)
Air Dolomiti	14	(- 5)	6.4 (- 1.7)	19	(± 0)	9.1 (+ 1.0)
Germanwings	22	(+ 2)	6.5 (+ 0.4)	24	(± 0)	6.8 (+ 0.4)
Eurowings	37	(+ 13)	10.4 (- 1.2)	31	(+ 1)	10.2 (+ 1.3)
Contact Air	0	(- 15)	0 (- 6.1)	13	(+ 2)	6.9 (+ 1.4)
Augsburg Airways				10	(± 0)	6.8 (+ 1.3)
<b>Passenger airlines</b>	<b>411</b>	<b>(- 2)</b>	<b>10.4 (+ 0.4)</b>	<b>411</b>	<b>(+ 6)</b>	<b>10.2 (+ 0.5)</b>
Lufthansa Cargo	19	(± 0)	9.0 (+ 1.0)	19	(± 0)	9.0 (+ 1.0)
<b>Logistics</b>	<b>19</b>	<b>(± 0)</b>	<b>9.0 (+ 1.0)</b>	<b>19</b>	<b>(± 0)</b>	<b>9.0 (+ 1.0)</b>
Condor Flugdienst GmbH				22	(- 1)	9.7 (+ 0.6)
Condor Berlin GmbH				14	(+ 1)	6.6 (+ 0.3)
Thomas Cook Airlines UK				25	(+ 1)	10.2 (+ 1.8)
Thomas Cook Airlines Belgium				6	(+ 1)	11.5 (+ 2.5)
<b>Leisure travel</b>				<b>67</b>	<b>(+ 2)</b>	<b>9.4 (+ 1.1)</b>
<b>Group, total</b>	<b>430</b>	<b>(- 2)</b>	<b>10.3 (+ 0.5)</b>	<b>497</b>	<b>(+ 8)</b>	<b>10.1 (+ 0.6)</b>

<sup>1</sup> See also explanations concerning the scope of consolidation in the section "About this report" on → page 5.<sup>2</sup> Aircraft in the Group's possession. <sup>3</sup> Aircraft operated by the Group.

oriented," explains Dr. Holger Häty, member of the Airline Executive Board and responsible for Network Management. So customers enjoy a greater selection: If no direct flight is available, they can select a transfer connection via one of the hubs that best suits their own time planning.

Lufthansa's operative business has grown significantly over the last years. Today, the airline operates twice as many aircraft as it did ten years ago. At the same time, competitive structures have become appreciably more complex. By assigning specific parts of the fleet to its two major hubs in November 2006, Lufthansa has again reduced this complexity – and increased stability in planning at the same time. Additionally, the managers responsible at these locations are able to react more swiftly to current developments in flight operations. They are also better able to change and exchange aircraft capacities at short notice.

By comparing the two hubs, Lufthansa's management is able to draw important conclusions with regard to improving operational processes and strategic decisions. For Lufthansa, the multi-hub strategy also forms the organizational basis for additional growth, as it gives the airline the option of simply integrating additional hubs.

**Lufthansa Passenger Airline**

	DLH: 30 aircraft, 111 seats, 2,500 km range
<b>Boeing 737-500</b>	
	DLH: 33 aircraft, 127 seats, 2,500 km range
<b>Boeing 737-300</b>	
	DLH: 18 aircraft, 132 seats, 3,500 km range
<b>Airbus A319-100</b>	
	DLH: 36 aircraft, 156 seats, 3,500 km range
<b>Airbus A320-200</b>	
	DLH: 26 aircraft, 190 seats, 2,900/4,100 km range
<b>Airbus A321-100/200</b>	
	DLH: 13 aircraft, 232/280 seats, 5,900/3,400 km range
<b>Airbus A300-600</b>	
	DLH: 10 aircraft, 221 seats, 10,000 km range
<b>Airbus A330-300</b>	
	DLH: 28 aircraft, 221 seats*, 12,400 km range *differing seat configurations in operation
<b>Airbus A340-300</b>	
	DLH: 14 aircraft, 345 seats*, 12,200 km range *differing seat configurations in operation
<b>Airbus A340-600</b>	
	DLH: 30 aircraft, 390 seats*, 12,500 km range *differing seat configurations in operation
<b>Boeing 747-400</b>	

**Lufthansa Regional**

	DLA: 6 aircraft, 46 seats, 900 km range KIS: 7 aircraft, 44 seats, 900 km range
<b>ATR 42-500</b>	
	DLA: 8 aircraft, 64 seats, 900 km range KIS: 6 aircraft, 68 seats, 900 km range
<b>ATR 72-500</b>	
	CLH: 18 aircraft, 93 seats, 2,200 km range
<b>Avro RJ85</b>	
	EWG: 4 aircraft, 92 seats, 1,600 km range
<b>BAe 146-200</b>	

AUB = Augsburg Airways      CIB = Condor Berlin      DLA = Air Dolomiti      EWG = Eurowings  
 CFG = Condor Flugdienst      CLH = Lufthansa CityLine      DLH = Lufthansa Passenger Airline      GEC = Lufthansa Cargo

**Lufthansa Regional**



**BAe 146-300**

DLA: 5 aircraft, 99 seats, 1,800 km range  
EWG: 10 aircraft, 98 seats, 1,800 km range



**CRJ200**

CLH: 26 aircraft, 50 seats, 2,000 km range  
EWG: 17 aircraft, 50 seats, 2,000 km range



**CRJ700**

CLH: 20 aircraft, 70 seats, 2,300 km range



**CRJ900**

CLH: 12 aircraft, 84 seats, 2,100 km range



**DHC8-300**

AUB: 5 aircraft, 50 seats, 1,200 km range



**DHC8-400**

AUB: 5 aircraft, 70 seats, 1,200 km range

**Germanwings**



**Airbus A319-100**

GWL: 21 aircraft, 144 seats\*, 3,500 km range  
\*differing seat configurations in operation



**Airbus A320-200**

GWL: 3 aircraft, 174 seats, 3,500 km range

**Thomas Cook**



**Airbus A320-200**

CIB: 14 aircraft, 174 seats, 4,600 km range  
TCW: 6 aircraft, 180 seats, 4,000 km range  
TCX: 4 aircraft, 180 seats, 3,900 km range



**Boeing 757-200**

TCX: 16 aircraft, 235 seats, 5,600 km range



**Boeing 757-300**

CFG: 13 aircraft, 265 seats, 5,400 km range  
TCX: 2 aircraft, 280 seats, 4,000 km range



**Airbus A330-200**

TCX: 3 aircraft, 354 seats, 11,000 km range



**Boeing 767-300ER**

CFG: 9 aircraft, 269 seats, 10,600 km range

**Lufthansa Cargo**



**Boeing MD-11F**

GEC: 19 aircraft, 516 m<sup>3</sup>/89.4 t, 7,000 km range

GWL = Germanwings  
KIS = Contact Air

TCW = Thomas Cook Belgium  
TCX = Thomas Cook UK

Number of aircraft in operation  
on 31.12.2006

Ranges indicated at maximum  
passenger numbers or payload  
respectively

## Social responsibility

# Finding and binding talent

Qualified personnel are a valuable resource for any company. With its external talent management, Lufthansa has created an instrument that makes the search for best-qualified junior employees easier. It also serves to bind suitable talent to the Group over the long-term. This new tool makes Lufthansa a pioneer in forward-looking personnel marketing.

Lufthansa has received numerous international awards for its management staff development and high-quality, practice-oriented continuous training.



Until recently, companies in Germany seemed to have little trouble finding new employees: While the number of job offers was low to moderate, the number of job seekers was high. But this is only a half-truth, as qualified specialized personnel in particular are being sought ever more urgently. For example, the Association of German Engineers (VDI) spoke in December 2006 of about 22,000 jobs for engineers that could not be filled – a significantly higher number than only a year earlier. And despite the introduction of a green-card scheme, there is a lack of junior employees in the IT industry as well. The current demographic development in Germany is set to further aggravate this lack of management and specialized personnel. In turn, this trend could seriously jeopardize the competitiveness of the German economy, experts believe. Even if restructuring personnel management is not an urgent necessity yet from today's perspective, the search for suitably qualified employees is certain to become a new challenge for companies in future.

### Forward-looking personnel policy

Lufthansa took on this challenge early and added a long-term strategy to its classic personnel marketing: With its innovative talent management system, the Group has made it possible to generate interest in Lufthansa among suitable external candidates even when no appropriate positions are currently vacant. Therefore, Lufthansa can face an increasing shortage of talent with greater calm, as this system reduces the risks resulting from fluctuations in the job market.

The Lufthansa Group enjoys a high level of attractiveness among prospective employees. This is evidenced by a number of rankings that consistently place the company among Germany's most attractive employers. A current survey by market research company Universum Communications, for example, shows that graduates with a business degree rank Lufthansa third among the



most attractive employers Germany-wide. Among graduates with a degree in the natural sciences, the Group ranks sixth.

The Group's appeal for junior talent both in Germany and abroad is correspondingly strong. Over the past years, the number of job applicants has even increased significantly: While there were 46,000 applications in 2005, this number increased to 97,500 in 2006. "In future, the task of personnel managers will be to preserve talent – and thus the resource 'knowledge' – and to bind knowledge bearers to the Group long-term," says Stefan Lauer, member of Lufthansa's Executive Board and Chief Officer Aviation Services and Human Resources. "Our digitalized recruiting system makes an important contribution in this area."

#### **Binding applicants long-term**

While hardly anyone in Germany sent an application via the Internet ten years ago, a little more than half of all job applications are

posted digitally today. Lufthansa launched an intensive digitalization drive in applications management as early as 2002 and continues this approach today. "Nowadays, 96.5 percent of all applications reach us digitally," says Doris Krüger, Director Corporate Personnel Marketing and Recruitment, about this successful initiative.

The central platform for digital personnel recruitment is the job and career portal [www.Be-Lufthansa.com](http://www.Be-Lufthansa.com). Since its introduction in October 2002, the portal has systematically added new functions, including an adaptive questionnaire and online tests. But this innovative talent management concept goes far beyond electronic applications. Its core element is a paradigm change which relinquishes the short-term administration of speculative applications in favor of a long-term bond between applicant and company. For this purpose, the company created in July 2005 a so-called "talent pool," in which the data of job seekers who might be of interest for Lufthansa can be stored. "This tool enables us

to actively maintain contacts with external applicants long-term and to recruit new employees from the pool," Krüger explains. In the first 12 months following the creation of the talent pool, 25,000 candidates signed themselves up; today, about 40,000 applicants are registered. "This is an incredible growth rate over a short period of time," the personnel manager says, "and we're getting new applicants all the time."

In this way, the Group has at its disposal a constant store of potential new employees, which it can use to secure its needs for management and specialized personnel in junior positions. It can also take advantage of this store to react flexibly to changing business strategies or job market conditions.

### Both sides benefit

In an ideal case, switching from classic speculative applications to applicant registration results in binding external talents to the company over their entire career cycle. The online pool allows applicants to first enter and later modify their profiles themselves. This means they are responsible for keeping their own data up-to-date and for recording all the steps they take to acquire new qualifications. This approach gives applicants an easy-to-use way to update their digitalized application documents at any time and to maintain the contact with Lufthansa as long as they wish. Once a job has been filled, the company can use this system to maintain the contact with other candidates interested in this or a similar position. Before Lufthansa simply lost out on valuable talent, as applicants ordinarily do not apply twice to the same company. For job seekers, the advantage is an increased likelihood of finding a job, because a "career assistant" helps in the search for vacancies. For the Group, maintaining the interest of applicants is also beneficial for its perception as an attractive employer.

Additionally, digitalized preselection by means of differentiated tests increases the fit of those applicants who are invited for a personal interview. The online process filters out those applicants that are definitely not suitable for a particular job. This boosts the efficiency of the preselection process, as it not only shortens the time needed to fill a position but also reduces the number of interviews and raises their success rate. The related costs decline at the same time, as the pool of external applicants is always checked before advertising a vacancy publicly. For this purpose, the department seeking to fill a position contacts the personnel service, which accesses the pool and suggests a selection of candidates. The search is facilitated by sorting the applicants according to criteria such as qualification levels and job groups – called "job families" in Lufthansa's talent management.

Since December 2006, managers and selected personnel managers have had access to the pool via the intranet "eBase." As soon as a job becomes vacant, the department head concerned can make his or her own preselection. "This again reduces the time between a job's becoming available and its being filled," explains Krüger.

The improved level of effectiveness of these recruitment methods – characterized by lower costs, better qualified applicants and faster filling of vacancies – increases the Group's competitiveness in the globalized market and supports it in the "competition for talents."

### Focused support for internal talent

The preselection of external applicants is but one of the many facets of Lufthansa's innovative and long-term personnel marketing. That the Group also looks after its internal talent in an exemplary manner is evidenced by the award it received in February 2007 in the context of the business competition "Talent Inside," which is organized by the initiative "Potential Frankfurt Rhein Main." This initiative is a joint project involving business, politics and the media. It honors companies that use a comprehensive approach to create attractive work environments for their employees, including training and motivating them as well as maintaining their loyalty to the company.

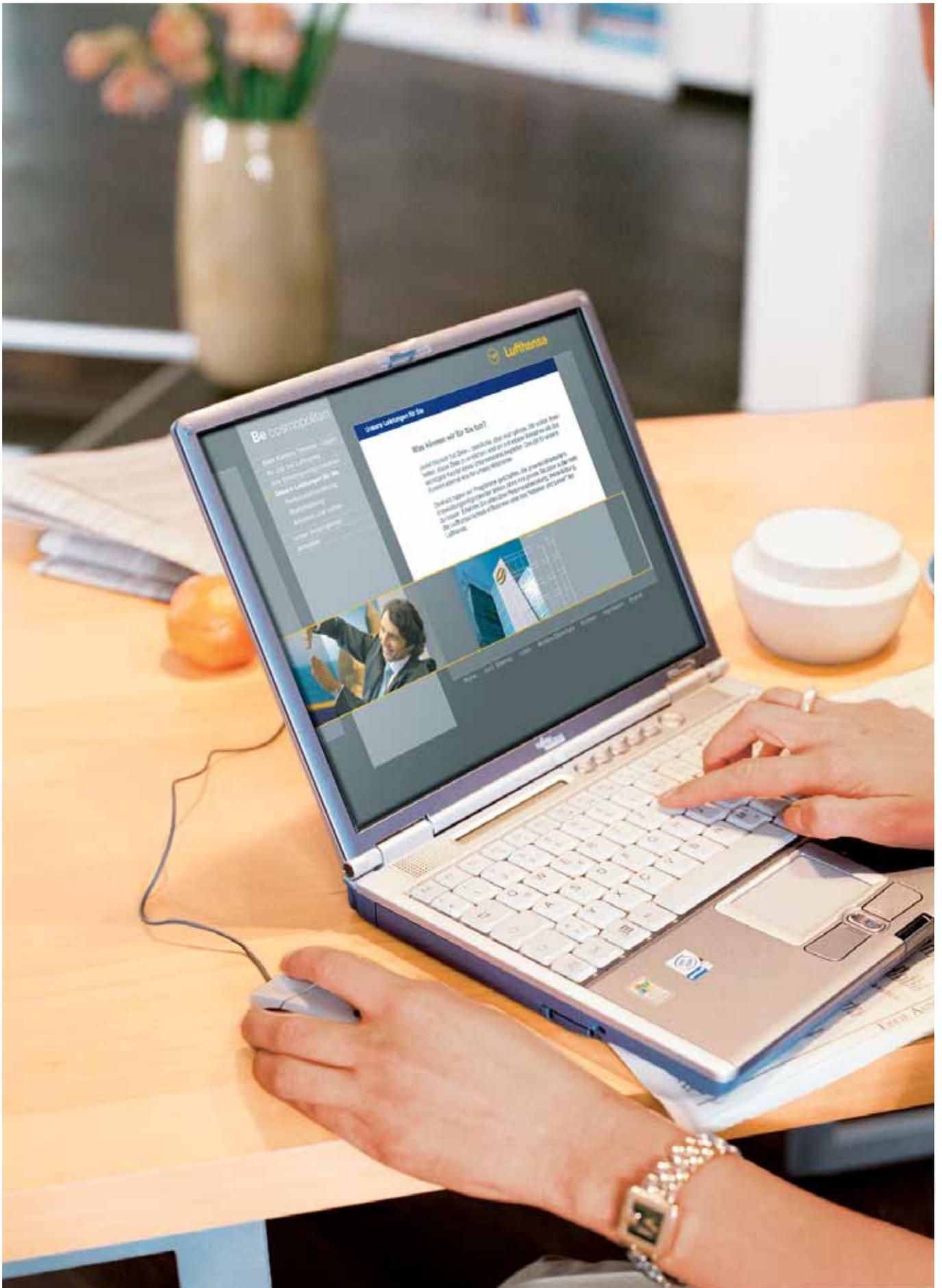
"Nowadays, 96.5 percent of all applications reach us digitally."

Doris Krüger, Director Corporate Personnel  
Marketing and Recruitment



Lufthansa's Internal Talent Management (ITM) is future-oriented employee support aimed at finding the talent needed within the company and applying it in a focused manner. But "only those who know the individual abilities and career interests of their employees can give optimum support and find suitable talent for vacancies in a timely fashion," says Dr. Michael Christ, Head of Corporate Executive Development and Lufthansa School of Business, about the system. For this reason, regular surveys concerning the needs in individual job families, annual performance reviews and individual development measures are all interlinked. "In our central management staff development, for example, we draw up instruments, guidelines and processes for a Group-wide talent management and then implement them. Career models geared to generalists as well as specialists offer talents with the most varied profiles suitable perspectives for their entire careers. The Lufthansa Development Center, the Lufthansa Leadership Feedback and personal counseling help in deciding on the right job switches and the right development measures in each case," outlines Christ.

The Group has received numerous international awards for its management staff development and training. For instance, the Lufthansa School of Business, Germany's first Corporate University, stands for high-quality and practice-oriented continuing education within the Group. In 2000 it received the award for the best European Corporate University, in 2005 for the interlinking of continuing education programs and the company's strategy, and





in 2006 for the innovative cooperation with external teaching partners including business schools and universities. The School's latest award, which it received in February 2007, is further evidence of its top position. Beyond that, in 2005 Hewitt and Kienbaum ranked Lufthansa's management staff development in the "Top Ten Companies for Leaders Winner – Europe."

#### **Interfaces support the search**

"If there are not enough potential candidates for a given job group or performance level within the company, we increase the influx from outside," explains Christ. The search is then continued in the talent pool, where the personnel managers only need to enter the hiring criteria to receive a selection of candidates that

correspond to the target group's requirements. An example of such search criteria might be: business graduate with an emphasis in international management and knowledge of French. Graduates from specific universities can also be found easily in this way. Suitable candidates are contacted in writing and asked to get in touch with the company should they be interested.

An interface between internal and external talent management arises as a result of long-term ITM planning, which determines the requirements of specific job families for several years in advance. "If we see, for example, that six jobs will have to be filled with lawyers in the next five to seven years but that there are only three suitable candidates among our employees, then the man-

The Lufthansa Group is one of Germany's preferred employers. In 2006, the share of female employees stood at 41.5 percent.

ager responsible for candidate selections for trainee programs can be informed accordingly. The next time the company hires new employees, special emphasis can be given to lawyers," Krüger explains.

#### The future will bring new challenges

At a time of European integration and globalization, Lufthansa is increasingly active in the worldwide markets. As a result, the company's rising interest in foreign applicants is further intensified by the international competition for the best junior employees. Lufthansa takes this development into account and offers its career portal [www.Be-Lufthansa.com](http://www.Be-Lufthansa.com) fully bilingually. It also has offered its entire online assessment, including all questionnaires and tests, in German and English since 2006. In this way, foreign applicants have significantly better opportunities.

One further challenge the future will bring is that of an aging population. "While the company's attractiveness in the job market continues to allow us to generate interest among younger job seekers worldwide, our existing employees are getting older on average," Krüger describes the situation. As a result, the requirements employees have to fulfill are changing. Tomorrow's talent will have different profiles from today's and will repeatedly pass through different phases in the context of lifelong learning. "We need new concepts for continuing education, health

"Our company's performance and innovative force depends on the optimum long-term qualification of our employees."

Dr. Michael Christ, Head of Corporate Executive Development and Lufthansa School of Business



#### Diversity as a factor in business success

Of the 94,510 Lufthansa employees worldwide, there are ...

- 41.5 % women
- 12.9 % women in management positions
- 4.4 % of pilots who are women
- 145 nationalities represented
- 66.9 % working in Germany
- 12.3 % of employees working in Germany without German citizenship
- 40.2 years as the average age
- 18.9 % people over 50 years old
- 3.4 % people with disabilities

(as of 31.12.2006)

#### Data on the demographic development

Fewer and fewer children are being born in Europe, while the population is aging due to steady increases in average life expectancy. In November 2006, Germany's Federal Statistical Office forecast that the country's population will decrease from currently 82.4 million to as few as 69 million by 2050. Experts predict that this development will mean that highly qualified employees and members of certain professional groups will be difficult to find in the near future in Germany too. Today, this demographic trend is ever more frequently reflected in the increasing average age of companies' work forces. This is also the case at Lufthansa, where the average employee was 40.2 years old in 2006. In 1999, Lufthansa employees were 38.4 years old on average. Further causes for this increase in average ages is the expected termination of age-related part-time options by the end of this decade and the upward shift in retirement age.

care and training to adapt to the different performance abilities of older employees," Krüger clarifies. These changes affect both the internal and the external talent management. "This is a huge conceptual task, which we address with a cross-departmental approach," Christ adds. "Our company's performance and innovative force depends on the optimum long-term qualification of our employees. And we will only be successful if we all join forces. The work on this has already begun."

## Diversity **Variety within the company**

Diversity Management describes a goal-oriented way of managing the differences among human beings. It links social concerns with the interests of a market economy by using these different potentials as advantageously as possible for the company and its employees. The term “diversity” represents variety in age, gender, race, ethnic origin, psychic and physical status, sexual identity, religion, marital status, parenthood, education, life experience and professional expertise as well as other characteristics.

Tolerance and appreciation of those who are different from ourselves are the foundations of human coexistence – especially in a world that has come closer together. For Lufthansa, encountering and working together with people from different cultures and nationalities has been a matter of fact all along. More than that, this kind of diversity has become a part of the shared corporate culture. Accordingly, a general ethical consensus is not only lived out in the company every day but also used to economic advantage. Employees who are respected and appreciated because of their individuality are more motivated and productive, something hardly anyone would dispute today. A heterogeneous staff promotes not only the teams’ creativity but also the employer’s innovative drive. Diversity also reflects the company’s international customers. For these reasons, the airline adopted a comprehensive approach to diversity management early on. By creating its own organizational unit “Change Management and Diversity” in 2001, Lufthansa took on a pioneering role in Germany.

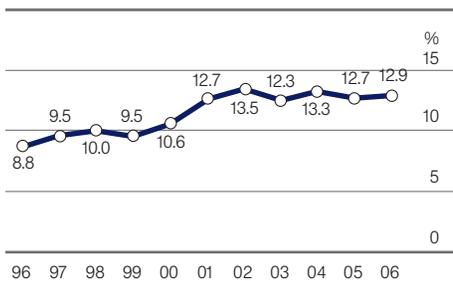
Lufthansa accepts the General Equal Treatment Act (AGG) passed by the Federal Government on August 14, 2006. However, the Group has met the requirements covered by the law for many years. It forbids discrimination on the grounds of ethnic origin, religion, handicaps, age, gender or sexual identity – with few exceptions. To give its employees the opportunity to inform themselves about the new legal situation, Lufthansa has put an introductory module concerning the new law on its intranet, where those interested can learn about the resulting rights and obligations. Requirement-oriented introductory tools were developed for employees, managers and personnel managers respectively. The Lufthansa AGG Tool is also available to other companies via the Confederation of German Employers’ Associations (BDA). Information concerning the new law is available both electronically and in printed form.

### **Opportunities for women**

Lufthansa takes equal opportunity seriously: The share of female managers has been rising for a number of years – including 2006. At almost 13 percent, an above-average share of women now hold management positions at the Group – also at the highest levels of leadership.

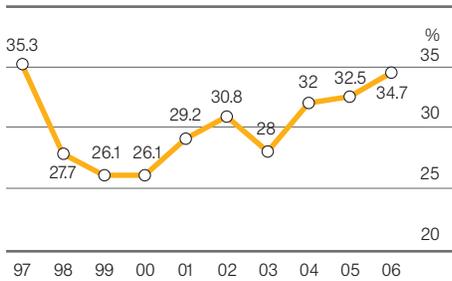
To further strengthen the position of women in management positions, Lufthansa has renewed its participation in an inter-company cross-mentoring program in September 2006. The mentees already work in managing positions with staff responsibilities, but are interested in further developing their managing qualities, determining their next career goals and establishing more intense network contacts. For this purpose, they can exchange experiences with managers working on higher hierarchical levels of the program’s partner companies, such as Bosch, Deutsche Bank or Merck. The mentors also benefit from these exchanges as they are confronted with the challenges that women have to meet in daily working life. The results of these discussions have inspired quite a few participants to reflect on their own actions

**Women in management positions at the Lufthansa Group**  
in percent



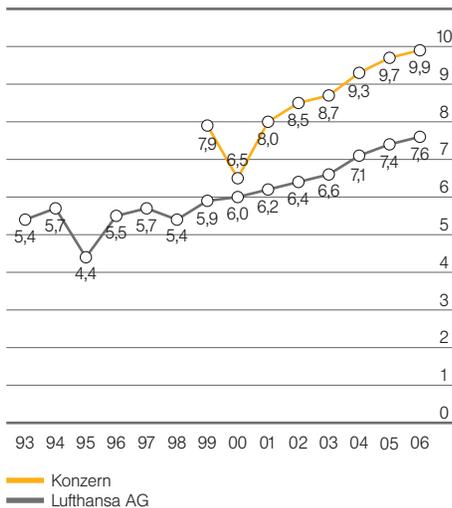
**Women in management positions with staff responsibility at the Lufthansa Group**

in percent



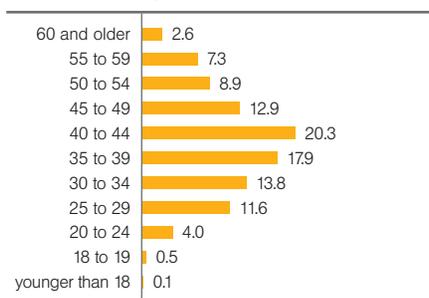
**Anteil der Mitarbeitenden über 55**

Angaben in Prozent



**Age structure at the Lufthansa Group**

2006, distribution in percent



**People with severe disabilities at the Lufthansa Group**

2006, distribution in percent



and communication styles. Workshops accompany the process, helping the female participants to examine their own competencies, use of power and career strategies.

When choosing a career, many girls today still decide in favor of classic “female” occupations. By participating in the Germany-wide initiative “Girls’ Day,” Lufthansa aims at giving potential female junior employees an opportunity to take a look at occupations more typically associated with men and showing them the full spectrum of occupational choices. In April 2006, the Group again invited girls to gather information about the trainee professions at Lufthansa. A total of 232 female students between the ages of 12 and 16 accepted the invitation and thus became better acquainted with the areas of MRO (Maintenance, Repair and Overhaul), IT and logistics.

**The demographic challenge facing Lufthansa**

Many European and other western countries are in the middle of a far-reaching structural change from an industrial society to a service and knowledge society. As a result of this restructuring, qualified employees in certain industrial occupations, for example, have difficulties finding work, while in other branches qualified personnel, such as engineers and IT specialists, are urgently sought after. As Lufthansa counts among Germany’s most popular employers, the airline currently experiences no shortage of junior employees, even in these occupations. Nonetheless, the average age across the Group has risen continuously over the past years, just as it has for the population as a whole. In 2006, the average Lufthansa employee was 40.2 years old, and almost every fifth employee was over 50.

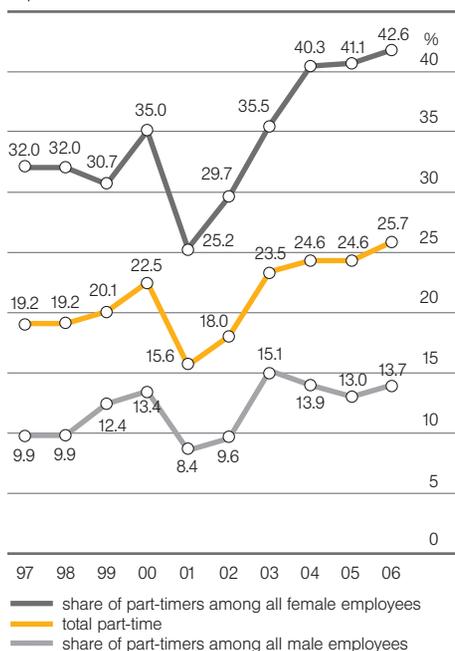
The company appreciates its “senior professionals” for their technical and social competencies. Younger employees also benefit from the professional experience their senior colleagues have gathered over the years, so it is not surprising that teams with mixed ages have proven to be the most productive. However, the rising average age of employees implies consequences for long-term personnel strategy affecting areas such as lifelong learning and preventative health care. Lufthansa guarantees the continuing education of its employees by means of numerous qualification measures offered to employees of all age groups. Here professional and methodological competencies are trained as well as social and personal skills (see also section “Knowledge secures opportunities” on → page 47).

**Mentoring for employees with disabilities**

Lufthansa commits itself in many ways to supporting its employees with disabilities. At certain Group companies, up to 10 percent of employees have severe disabilities. This means that the legal minimum quota for handicapped employees is surpassed in those parts of the Lufthansa Group. At the Group companies with flight operations, however, the share of disabled employees is below the legal quota of 5 percent. This is primarily due to the very strict requirements that flying personnel must fulfill for safety reasons.

To promote the integration and professional development of physically and psychologically challenged employees, Lufthansa launched a mentoring program for the severely handicapped three years ago which remains unique in Germany. In a total of ten “tandems,” disabled employees are each paired with a manager who serves as his or her mentor. Mentors and mentees come from different professional areas and companies within the Group. The goal of this innovative program is to reduce anxieties on both sides by getting mentors and mentees to work together on identifying everyday challenges and removing hurdles.

**Part-time employment at the Lufthansa Group**  
in percent



## Work-life balance

## Modern work-time models

Beyond this Group-wide program, the individual Lufthansa companies are committed to the integration of people with disabilities through a broad range of individual measures. Lufthansa Technik, for instance, received an award from the City of Hamburg in 2006 for its training program for deaf employees.

### Lufthansa serves as an example of integration

It stands to reason that a company with global business activities and international customers will have international employees. In Germany, Lufthansa employs people from 116 countries, more than 12 percent of whom have non-German passports. Worldwide, people from 145 nations work for the Group. Often enough, the biggest challenge in daily work is dealing with language barriers. Therefore, the Group offers its employees special rates for language courses, both in German and other languages, run by cooperation partners.

### Intercultural competence

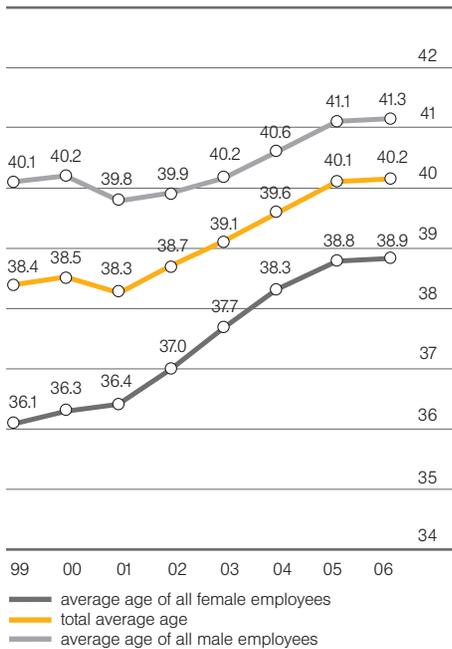
Given not only the Group's international work force but also its globe-spanning customer base, the understanding of cultural differences is one of the most important abilities for many employees. On flights to Asia, for example, the airline employs flight attendants who have specific knowledge of Asian customs and products as they are natives of these countries. Language courses and trainings to strengthen intercultural competencies are important elements of staff development. All employees can book such seminars on the company intranet. These courses include lectures, discussions and group work to provide behavior tips and exchange experiences.

Transferring employees abroad is another way to strengthen their intercultural competence. At Lufthansa, this involves posting staff employed in Germany to foreign countries or vice versa as well as third-country postings. In 2006, the Group transferred 177 employees to branch operations outside of Germany. On average, 533 Lufthansa employees are on foreign postings of an average duration of 5 years. Employees and their family members are prepared for their stay in the host country before the posting. Continuous support during their posting helps maintain the contact to their home country and facilitates their reintegration upon their return.

The days when the workday began with on-the-dot punctuality are gone for those working in administrative areas. Today, employees increasingly appreciate a more flexible scheduling of their working hours. This emerging change in society is underscored not least by the recent amendment of Germany's Parental Benefits Law. The individual balance between family and work is thus becoming ever more important. Lufthansa responds to this growing preference in society by offering a number of different work-time models.

For several decades the Group has offered – whenever operational requirements allow – numerous options for adapting work time to personal life situations. This includes models involving part-time and flexible working hours, which have since become widespread in business. Additionally, Lufthansa offers the options of alternating tele-work and unpaid leaves of absence. There are also partly autonomous work groups at the Group, which independently assign working hours and tasks among their members.

**Average age at the Lufthansa Group**  
in years



The latest model for more flexible time management is “work time based on trust,” which has been offered to all employee groups working at the new Lufthansa Aviation Center since the building’s occupation. Actual work time is no longer recorded for those employees who have chosen this option. Instead, employees are evaluated based on their work performance and task fulfillment. This new option supports the employees’ independence and their entrepreneurial orientation in terms of an efficient use of their work time.

**Alumni network**

At the end of their careers, many employees wish to maintain their contacts with former colleagues. Leaving professional life is not easy for many people, especially when their work offered them a fulfilling purpose in life. Each retiree used to spend a lot of time with his or her coworkers. The Association of Lufthansa Retirees offers the possibility of linking retired life with the familiar working life. The association is the umbrella organization and central contact point for the regional associations of Lufthansa alumni. The alumni associations around the world offer employees who are about to retire or have retired the opportunity of staying in touch with colleagues as well as with the company. So far, 2,688 former Lufthansa employees have joined the association. A reunion takes place every year; the Group again provided the Training Center in Seeheim for this purpose in 2006.

**Family and work**

For many years, Lufthansa has offered comprehensive support for employees with families. One area of emphasis is child care because experience shows that finding suitable child-care options is one of the biggest burdens for working parents. Lufthansa employees with children can contact the partner organization “Family Service,” which finds the right offers from day care for toddlers to homework assistance for children of all ages. With “Fluggiland” the airline has created an emergency care service in Frankfurt, which takes over when child minders cancel at short notice or day-care centers remain closed. Additionally, Lufthansa provides ad hoc support for its employees in 11 further cities in Germany. On January 1, 2007, an additional emergency day-care center named “Towerkids” was opened in Munich right at the airport. It takes care of children up to the age of 12 at short notice.

Care for elder people is increasingly becoming a problem for families. Lufthansa takes this situation into account by offering “Elder Care.” Experts at Family Service give advice to employees with relatives who need care and help with finding suitable care services.

Beyond care options, flexible working hours are the most important element for parents in maintaining a balance between work and private life. The wide range of innovative work-time models allow individual solutions that are adapted to specific phases in life – with the result that parental leave becomes significantly shorter on average as work and family become compatible with each other. For mothers, in particular, this approach makes the return to work easier, all the more so as a shorter period of absence means a significantly lower loss of qualifications. In this way, Lufthansa creates practicable solutions for reducing the length of parental leave, a move desired by many parents and demanded by politicians for some time. In addition, the Group is able to significantly cut the high cost of interim solutions.

## Employment policy based on partnership

## Job engine Lufthansa

Today's fathers show a great deal more interest in and commitment to bringing up their children than used to be the case. However, it is still significantly more difficult for men to combine work and family, as the job environment is seldom adapted to meet the needs of child-raising fathers. With its highly popular "Daddy-Cool Seminar," Lufthansa has taken a new path and informs fathers and fathers-to-be about public and Group-internal offerings that support families.

Following a difficult phase in employment policy, new jobs were again created at the Lufthansa Group in 2005. This positive trend has even accelerated with the creation of 2,500 new jobs last year and is set to continue in 2007: A total of 3,000 new employees will be hired this year. "The impressive figure of 5,500 new employees hired in just two years again underlines the role of global air transport as a job engine for Germany as a business location," says Wolfgang Mayrhuber, Chairman of the Executive Board and CEO Deutsche Lufthansa AG.

Suitable people have to be found to fill these new jobs. The advanced online recruitment portal "Be-Lufthansa.com" is to support this task. It is offered in German and English to attract applicants from a large number of countries (see also section "Finding and binding talent" on → page 36).

### Codetermination in the company

Within the framework of the different models of codetermination which have their origins in law, Lufthansa aims at maintaining an active discussion of problems and opposing interests and at striking a fair balance.

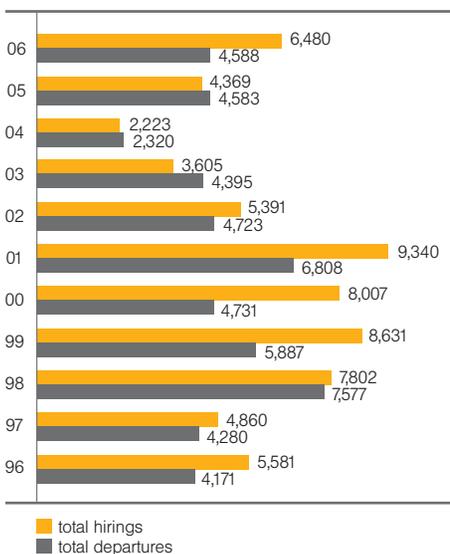
"Open and intensive dialogue early on is a key to keeping the interests of the company and those of the employees in the balance that is so important for joint success in a competitive environment," explains Dr. Martin Schmitt, Head of Group Human Resource Policies. Codetermination work takes place in a collaborative but transparent manner. The trainings required by industrial-relations law ensure the necessary "eye level."

Over time, the scope of topics demanding codetermination has expanded in particular to include manifold IT issues and the proper handling of portfolio changes.

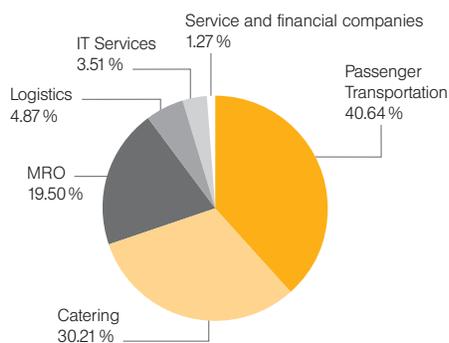
### Success for all

The interest of companies in employee shareholdings has sharply increased over the last few years. According to a survey by the Nuremberg-based Institute for Labor Market and Professional Research (IAB), the number of companies offering individual models of equity participation has risen to more than 50,000. Lufthansa has offered profit sharing since the late 1960s as an expression of its employment policy based on partnership, making it one of the pioneers in this area. Since the mid-1990s, profit sharing has been expanded consistently as an employee participation program – and complemented by the option of purchasing shares. In this way, Lufthansa employees have directly benefited from the positive development of the company's business over the last years. For fiscal year 2006, employees paid according to wage agreement received a payout of 300 euros, a significant increase over the previous year. Alternatively, employees could opt for Lufthansa shares valued at 366 euros, whose value has increased by almost 45 percent since 2005. With the "LH-Chance" program, laid out last year for the ninth time, Lufthansa offers a third profit-sharing option for employees paid according to wage agreement.

**Employment at the Lufthansa Group**  
hirings vs. departures



**Distribution of employees within the Lufthansa Group**  
2006, in percent



## Training and continuing education

Participants receive a certain number of Lufthansa shares free of charge, plus others financed by an interest-free loan. Again in 2006, nearly every second employee opted either for traditional employee shares or for the "LH-Chance" program.

In addition to "LH-Chance" the company has offered "LH-Performance," a share program specifically designed for managers and employees paid outside of wage agreements, for the last 10 years. "LH-Performance" combines the participants' own investments in Lufthansa shares with the granting of an outperformance option. This option results in a payout if the price of the Lufthansa share has developed more favorably over the specified period than a comparative set comprising shares of the airline's European competitors.

### Employees give new impulses

Year after year, the results of the ideas management program "Lufthansa Impulses" demonstrate that the Group enjoys a creative work environment. In 2006, employees again made numerous suggestions on how to reduce costs, simplify processes and improve products and services. Thanks to the creative ideas of its employees, the company saved more than 8 million euros in 2006. This is 3 million euros more than in 2005, despite the fact that the number of participants declined slightly to 2,200. This means the quality of the ideas submitted increased perceptibly. Most suggestions for improvements were submitted via the intranet "eBase." Interested employees may consult a dedicated "Impulses" information portal to find out if their ideas have already been suggested by a colleague or why their ideas may not have been accepted. Employees who have submitted a suggestion can check its processing status on the intranet at any time and thus actively support the examination process themselves. Suggestions are rewarded with bonuses of up to 102,000 euros.

## Knowledge secures opportunities

### Starting a professional career

Conducting business in a sustainable manner is not the only way that Lufthansa assumes responsibility for future generations. Training junior employees also has great importance at the Group and offers young people professional opportunities and perspectives even in times of scarce openings for apprentices. Currently, Lufthansa employs about 1,600 trainees; in summer 2006 alone, 300 new junior employees started their professional careers at the Group. Interested young people can choose from 40 trainee professions, ranging from aircraft equipment mechanic to IT specialist or catering chef. Additionally, Lufthansa CityLine in Cologne has started a three-year training course this year in the area of materials management, leading to qualification as a specialist in inventory logistics. In general, apprentices have a good chance of being hired by Lufthansa, as the company has a tradition of training employees for its own needs.

In addition to professions taught in Germany's dual apprenticeship mode, Lufthansa runs specific courses to train service professionals who will work as flight attendants and in passenger care at airports. Strong growth in the company's operating areas resulted in the hiring of 1,600 service professionals in 2006, about 600 more than the year before. In addition, 204 trainee pilots started their careers at Lufthansa, a number that is also significantly higher than in 2005.

### **Studying outside the ivory tower**

Germany's dual apprenticeship model is recognized internationally, and in recent years dual courses of study have enjoyed increasing popularity. Lufthansa has taken part in this trend toward combining practical in-company training with an academic transfer of knowledge by developing ten dual courses of study in cooperation with renowned universities.

Lufthansa supports the "Bologna Process," which is to drive forward the internationalization of European university degrees – an important opportunity for German companies. International diplomas, such as bachelor's and master's degrees, not only allow German universities to become competitive in a globalized education market, but the new structures for courses of study and the European harmonization of degrees also promote the graduates' international competencies, which is a key qualification for global players such as Lufthansa. The airline underscored its support for the Bologna Process by signing the "Bachelor Welcome!" declaration in 2004. Two years later, leading German companies confirmed this commitment with the follow-up declaration "More Bachelors and Masters Welcome." In it, Lufthansa and other companies once again committed themselves to helping establish exemplary courses of study leading to bachelor's and master's degrees. The Group has implemented this commitment on a practical level by establishing its bachelor's degree course in Aviation Management: Starting in winter semester 2006/2007 the training course leading to qualification as an Aviation Management Professional is now linked to a bachelor's degree course in Business Administration in cooperation with the internationally renowned European Business School (EBS) in Oestrich-Winkel. This makes Lufthansa one of the first companies to integrate a business-oriented training course with the new bachelor's/master's degree structure.

The six-semester course of study combines general principles of business administration and specific knowledge in aviation management. It also promotes social and intercultural competencies, along with the ability to think and act in networked, interdisciplinary dimensions. In addition to a semester's internship, a posting abroad is a fixed component of this degree course. English is the language for all lectures, case studies and projects. "This way, we want to make the training of our junior managers even more international and practice-oriented," explains Stefan Lauer, member of Lufthansa's Executive Board and Chief Officer Aviation Services and Human Resources. "We offer young talent a highly qualified education and an attractive way of starting their careers at the Lufthansa Group."

### **Getting ahead with education**

Teaching its employees professional and personal competencies is part of Lufthansa's corporate strategy because "we view the Group's development and the individual's development as a single unit," explains Stefan Lauer. "It is important for us that our employees have the means to evolve their competencies and career opportunities in a focused manner." In this context, the airline aims at imparting tailor-made knowledge. Employees participate in efficient courses that help them get ahead, both personally and professionally. In so doing, they not only improve their personal employability but are also able to apply their knowledge directly within the company.

The success of this strategy is illustrated by the numerous international awards Lufthansa has received for its continuing education programs aimed at its managers. The Lufthansa School of Business (LHSB), Germany's oldest corporate university, has received multiple awards for its management development program. One area of emphasis here is becoming familiar with and learning to deal with different cul-

tures and markets, along with exchanging experiences with managers from other companies. Currently, other highly popular continuing education subjects include international management, entrepreneurship and intercultural communications.

LHSB's Corporate College offers employees at all levels courses on topics ranging from business small talk in English to personal development and intercultural competence. In spring 2006, for example, 720 Lufthansa employees from across the Group took part in lectures and seminars in the series "Fit for Change – Managing Volatility." Today's working environment is more and more affected by permanent changes, to which Lufthansa needs to respond swiftly and flexibly. This requires both flexible structures and employees who meet change in creative ways. During these two to three-day seminars, participants learned how to handle changing professional challenges. In workshops, they learned tools and approaches for shaping change in active ways. They also trained in methods to support staff during times of change, promote creativity, help shape processes and facilitate time management. The results were made available to all employees on the intranet "eBase." Furthermore, the Group's current strategy and the personnel policy derived from it were presented in lectures and discussions.

Lufthansa is also a pioneer in applying new learning technologies and digitalizing learning and knowledge processes. The company was using computer-based training methods as far back as the late 1960s. Yet the share that e-learning takes in training and continuing education measures has grown especially swiftly in recent years, from just under 10 percent in 2002 to nearly 30 percent in 2006. This is because computer-based learning plays such an important role as an innovative, flexible, efficient and cost-effective complement in the overall transfer of knowledge and information at Lufthansa. This tendency has also been reinforced by the necessity of lifelong learning and the increasing demand for training and information.

## Employee safety and health protection

### Health can be managed

For Lufthansa employees as well, health is life's most precious commodity. To help maintain its employees' health, the company offers a comprehensive in-house health management system. Lufthansa has set standards with its "Medical Services," whose experts are concerned with preventative measures and care in aviation medicine for employees and passengers. In September 2006, Medical Services, which are now certified as an Aeromedical Center, celebrated their 50-year anniversary. Lufthansa made its first step toward health management in 1956, when it hired a company physician – one year after resuming flight operations. Today, Medical Services count altogether 60 employees at its locations in Frankfurt, Hamburg and Munich, who specialize in industrial, travel and tropical medicine. In Frankfurt alone, ten physicians are on duty; worldwide, a total of 180 physicians are under contract at 81 locations to look after the airline's employees and passengers. Additionally, there are flight attendants with training in intensive medical care. They look after so-called PTC (Patient Transport Compartment) transports, whereby seriously ill patients receive intensive care during their journey. Lufthansa is the only airline worldwide to offer this service. In 2006, Lufthansa completed 72 PTC transports on routes worldwide.

Lufthansa employees also benefit in numerous ways from the knowledge concentrated at Medical Services: health consultations, preventative check-ups, job physicals, instruction in tropical health care, vaccination campaigns and first-aid training are but a few examples of how these physicians give employees hands-on advice and

support. Beyond medical care for its employees, Lufthansa is also committed to training and continuing education for physicians specializing in aviation medicine and to promoting research in air travel medicine. This is the domain of the Deutsche Akademie für Flug- und Reisemedizin (German Academy for Flight and Travel Medicine), which the airline jointly founded with the Deutsche Gesellschaft für Luft- und Raumfahrtmedizin (German Association for Aviation and Space Medicine).

### **Special offerings for special burdens**

The Group offers specific programs to promote health for employees working in areas with particular burdens.

Since January 2007 shift workers in aircraft maintenance, for example, have had the option of participating in an Alertness Management Training, which the German Aerospace Center (DLR) developed in cooperation with Medical Services. In two training sessions of 90 minutes each, employees learn strategies that can help them improve health, job safety and performance. "We pursue a holistic approach to preventing the overtiredness and health-related stress that changing working hours can produce," explains Dr. Günter Gensrich, the project's initiator.

At Lufthansa Technik, the initiative "LHT – More than a Job" is also involved in preventative health care. Initiative partners include the Lufthansa sports club "LSV" with physical fitness support and the cafeteria with healthy nutritional options.

Flight attendants benefit from the company agreement "Health Management," concluded in fall 2006. The company conforms to legally required employee orientation management by offering healthcare advice early on. Additionally, events focusing on preventative health care are offered several times per year. In 2006, flight attendants could participate in sponsored preventative check-ups offered as part of the event series "Healthy skin in flight." Regular publications, a dedicated health forum on the intranet, as well as expanded coverage of health-related topics in basic training and continuing education round off the offerings.

According to a study on the subject of work-life balance conducted by Professor Ruth Stock-Homburg at the Technical University Darmstadt, the work load of managers – especially of younger managers – is quite high and the ratio of professional to private life is often unbalanced. Consequently, they encounter particular risk of falling ill long-term due to burnout syndrome. Lufthansa managers from all business areas have the option of passing a preventative check-up every two-years in order to diagnose a dysfunctional work-life balance at an early stage and prevent health-related consequences such as burnout.

**Promoting individual responsibility**

The Group strengthens its employees' individual responsibility by providing information on subjects related to health and job safety at regular intervals. It also makes recommendations concerning ergonomically sensible ways of working and maintaining a healthy life style. In addition, the company offered flu vaccinations free of charge again in 2006.

**Social counseling**

One of the most important long-term preventative measures that Lufthansa offers is Social Counseling, which has been available since the 1980s. A team of six counselors advise employees in all types of crisis and conflict situations, whether they be work-related or of a private nature. The social counselors support the persons concerned in improving communications and developing social competencies. If necessary, they also act as mediators by gathering the parties in a conflictual situation around the same table for constructive discussions. The primary goal here is to find concrete solutions.

In those rare cases where a stressful overload leads to addictions, Social Counseling also offers support in cooperation with company physicians, detoxification clinics and rehabilitation institutions, making it easier for employees to use the options available. In this manner, not only can the persons concerned be protected from damage to their health, but their ability to work is also preserved.

**Job safety**

Lufthansa places the highest value on health-promoting working environments, a fact demonstrated by its commitment to job safety. A team of twenty employees, most of them safety engineers, inspects the company's work situations. Not only do they ensure adherence to high safety standards – in the area of fire protection, for example – and suggest preventative measures that can help avoid accidents or adverse health effects on the job. But for several years they have also increased their focus on adapting work stations to the latest ergonomic standards.

## Environment

# When kerosene becomes scarce ...

Crude oil is a finite resource. This is a known fact. The real crux of this issue is how long the worldwide reserves will actually last. Long-term, air transport will have to learn to accept that kerosene will become more scarce – and more expensive. This is why Lufthansa has an eye on tomorrow's fuel supply, today.



**Kerosene fuels the** air transport industry. Turbofan and turboprop aircraft engines have been operated so far almost exclusively with kerosene based on crude oil. So airlines – for whom this fuel represents one of the biggest cost items – are directly affected by the supply situation and the price developments in the crude oil markets. And in the long run, the supply of crude oil will become scarce, while prices will continue to rise.

### Declining crude oil reserves

The situation: About 42,000 oil fields have been discovered to date, the most important ones about 50 years ago. The 400 largest fields comprise more than 75 percent of the world's known crude oil reserves.<sup>2</sup> The annual discoveries of new reserves have been in decline since the 1960s. And since 1981, the world has consumed more oil each year than geologists have discovered in new reserves. Requirements are covered predominately from exploited fields. According to the International Energy Agency (IEA), secure crude oil supplies will last until 2030.

Energy companies and industry associations, on the other hand, are more optimistic and see sufficient supplies until the middle of the 21st century. After all, there is the possibility that rising oil prices in tandem with technological progress in production methods will

#### Kerosene

Produced by distilling crude oil, kerosene's characteristics make it the ideal fuel for air transport. Kerosene is characterized by an extremely high energy density of 43.1 megajoule per kilogram, which has a positive effect on total aircraft weight. In addition, it has a very low freezing point and remains liquid in aircraft tanks at ambient temperatures between minus 60 and minus 75 degrees Celsius. Thus, kerosene is a fuel suitable for cruising altitudes between 10,000 and 12,000 meters. Given these advantages, the entire air transport industry has been fully adapted to the use of kerosene. This is true for the engines and fuel tank systems of aircraft as well as for the supply infrastructure on the ground.

make the exploration of currently unprofitable reserves attractive. In this way, the declining production from conventional reserves could be compensated for the time being.

However, critical voices expect a decline in crude oil production over the short term and refer to the so-called "peak oil theory" of geologist M. King Hubbert. It claims that the maximum in oil production will be reached in the first half of the 21st century. This means that worldwide production cannot be increased any further. The result: The price of oil would inevitably increase, as supply can no longer meet steadily-rising demand. In the opinion of the Federal Institute for Geosciences and Natural Resources (BGR), no spectacular discoveries of new reserves are to be expected.

### Unrelenting demand

On the demand side, the trend clearly points upward. Since 1970, global crude oil consumption has nearly doubled while kerosene consumption has even quintupled. And an end of this trend is nowhere in sight: As recently as in 2004, worldwide demand for oil increased by 3.6 percent – the highest growth rate since 1978.



The sun provides unlimited energy: During daylight hours, the 14 electric engines of NASA's prototype "Helios" has an infinite supply of "fuel" at its disposal. The required energy is delivered by 62,000 solar cells on its wings. NASA uses this ultra-light aircraft to conduct atmospheric research.

<sup>2</sup> See the study commissioned by Lufthansa and conducted by the German Energy Agency (dena, Deutsche Energie-Agentur) "Kerosene: Availability and Alternatives," p. 8, referred to as "dena study" in the following.

The boom in demand is driven above all by consumers in Asia. China, a net oil exporter until 1992, has evolved into the second-largest consumer of crude oil following the USA.<sup>3</sup> In addition, India's recent economic growth has generated unforeseen oil needs. This trend is also reflected in the worldwide consumption of kerosene: While it stood at about 200 million tons in 2004, it is expected to rise to 285 million tons in 2015, according to estimates by the German Aerospace Center (DLR). NASA, the American aeronautical and space agency, predicts an increase to as much as 309 million tons.<sup>4</sup>

The world market prices for crude oil have also risen continuously since 2002, reaching the record high of US\$ 78.40 per barrel in July 2006. Responsible for this increase and the ever-stronger fluctuations in oil prices is not only rising demand but also a higher speculative influence. Fear of possible supply bottlenecks are driving prices up even before the resource has actually become more scarce.

According to the International Energy Agency (IEA), secure crude oil supplies will last until 2030.

A further central factor influencing price developments on the oil market is refinery capacity. Capacities are limited not only generally, but above all structurally. Consequently, there are bottlenecks in turning heavier products into lighter ones, such as kerosene. This situation may become even more critical long-term, as the future offerings of lighter types of crude oil, such as West Texas Intermediate (WTI) or Brent, will decline. And the important oil reserves in the Middle East consist primarily of heavier varieties, which yield a lower share of light products. "On the other hand, important refining and conversion capacities are now under construction, so this situation will ease up appreciably in a few years, at least for the time being," explains Helmut Fredrich, head of the Lufthansa Group's fuel management.

#### **Possible alternatives for kerosene**

Yet rising oil prices harbor not only risks but also opportunities for alternative fuels not based on crude oil. Today, there are a number of options for replacing kerosene, either partly or fully. Each of these options has its advantages and disadvantages. "All told, it must be possible to produce an alternative fuel in sufficient quantities and at acceptable costs and to obtain its certification for use in aviation. The most important aspect here is flight safety," explains Dr. Karlheinz Haag, head of Group Environmental Concepts at Lufthansa. Before being introduced in the market, alternative fuels must fulfill numerous criteria. These concern their combustion performance, compatibility with other materials, handling, fluidity at low temperatures, nozzle atomization and vaporization characteristics, the possibility of restarting the engines in flight,

their compatibility with additives and other characteristics. Meanwhile, the International Air Transport Association (IATA) has taken up the subject of "Alternative fuels for jets."

#### **Option 1: Oil sands**

In the area of non-conventional types of oil, great hopes are being placed on oil sands, the greatest deposits of which are found in Canada and Venezuela. They contain not oil, but bitumen, which can be treated to yield synthetic crude oil. Producing oil from oil sands is, however, extremely energy intensive. The production process itself requires half of the energy won, whereas the energy efficiency for producing conventional oil is above 90 percent.<sup>5</sup> And the environmental effects are problematic as well: For each barrel of synthetic oil produced from oil sands, more than 80 kilos of greenhouse gases and about 4 barrels of wastewater are generated. Additionally, it must be taken into consideration that even a massive expansion of oil sand extraction in Canada would cover less than 3 percent of current oil production.

#### **Award-winning fuel management**

In February 2007, the Armbrust Aviation Group again honored Lufthansa for the airline industry's best fuel management. In seven of the eight individual categories, the fuel suppliers surveyed ranked the Lufthansa Group number one. Among others, the company received awards in the categories "Best employees," "Quality-mindedness" and "Innovations." "Our long-term approach of taking the entire process of fuel management into consideration is paying off," says Helmut Fredrich, who heads Fuel Management at Lufthansa. Since 1990, the Group has successfully used hedging instruments to secure fuel prices and to protect itself against fluctuations in oil prices. In this period, fuel hedging has helped save the airline more than 1.5 billion euros.

#### **Option 2: Blending**

Blending, or stretching conventional kerosene with alternative fuel, could be a comparatively practicable solution. But research at Purdue University in the USA on blending kerosene with biodiesel produced on the basis of soybean oil has come up with fairly sobering results: The current composition standards for kerosene types Jet A and Jet A1 can only be maintained by a blending of maximum 2 percent. Furthermore, biodiesel tends toward a biologically induced reduction of its energy content, which is highly problematic in aviation.

#### **Option 3: Synthetic kerosene**

Mid- to long-term, the most promising option for civil aviation is the one offered by synthetic carbon-based fuels based on the Fischer-Tropsch or other methods of synthesis. This is the conclusion of the study "Kerosene: Availability and Alternatives,"

3 dena study, pp. 11–13.

4 dena study, p. 21.

5 dena study, p. 11.



Not only rape, but any kind of biomass – from sugarcane and straw to wood chips and algae – is a suitable raw material for the production of synthetic fuel.

commissioned by Lufthansa and conducted by the German Energy Agency (dena). Suitable raw materials are biomass, natural gas and coal. The chemical scientists Franz Fischer and Hans Tropsch developed the eponymous procedure for the large-scale industrial conversion of synthesis gas to liquid hydrocarbons back in 1925. The key advantage of this method is that kerosene thus produced is not only identical to kerosene based on crude oil, but also chemically more pure.

#### **BTL, or biomass to liquid**

Before the end of this decade, the first companies intend to produce synthetic fuel from biomass on a large industrial scale. All types of biomass are suitable as raw material – from “energy plants” such as rape and sugarcane to straw, wood chips and algae. After purification, the synthetic gas thus won is used to synthesize the type of fuel desired. The advantage: The fuel’s characteristics can be adapted specifically to current and future requirements of engine and motor technology. In cooperation with industry, scientists at the German Energy Agency are currently mapping out the creation of the technical and economic prerequisites for further investments in this area.<sup>6</sup>

BTL fuels are free from sulfur and nearly odorless. Furthermore, the combustion process releases only that quantity of CO<sub>2</sub> that the plants previously absorbed from the atmosphere to support their growth process. The overall climate balance sheet for biofuels, however, depends on how many emissions are generated by

cultivation, processing and transport. Beyond that, the large-scale cultivation of energy plants can damage the environment: Pesticides and fertilizers are used on fields, and carbons are released from the soil.

Ultimately, however, the success of BTL as the future fuel for aviation depends on the availability of the raw material, biomass. Both the automobile industry and – more recently – the energy industry are relying increasingly on biomass as a raw material. Furthermore, those plants grown for fuel production are not available for food production, though their cultivation does offer farmers new economic perspectives.

BTL is one of the second-generation biofuels. In comparison with bioethanol, biodiesel and vegetable oil – all first-generation biofuels – these make much more effective use of the energy potential of the plants involved. This is because their production uses not just specific plant parts containing oil, sugar or starch, but the entire plant.

#### **GTL, or gas to liquid**

Synthetic fuels on the basis of natural gas are gaining in importance. They are produced by the same means of synthesis as BTL. This technology gives mineral oil companies and countries with large natural gas reserves a solution for the transport

6 dena study, pp. 23–24.



Hydrogen is also a potential energy source for air transport. The greatest advantage is its high energy content in relation to its weight. Using it, however, would require the construction of an entirely new supply infrastructure – worldwide.

problems associated with natural gas. GTL is an alternative to liquefying natural gas by cooling (LNG, Liquefied Natural Gas). Pilot plants are now producing fuel for jet engines in the USA, and Shell has been operating the first commercial low-temperature GTL plant since 1993 in Malaysia. Currently, the GTL process is still very energy intensive, however. Another significant disadvantage of GTL in comparison with BTL is CO<sub>2</sub> emission, as this is still a fossil energy source and not a raw material that grows again.

#### **CTL, or coal to liquid**

The most comprehensive experience with Fischer-Tropsch fuels is associated with coal gasification. The South African mineral oil and chemicals group Sasol has been producing CTL fuels for more than 40 years. At Johannesburg International Airport, the company supplies more than 80 percent of its kerosene with a CTL share of about 40 percent. In addition, the U.S. Department of Defense finances programs to produce fuels from coal. Compared with conventional kerosene, CTL fuels have a significantly lower sulfur content. However, their CO<sub>2</sub> balance sheet is considerably worse than for GTL or especially than for BTL.

#### **Option 4: Hydrogen**

Hydrogen is also among the potential energy sources for aviation. In the second half of the 20th century, several attempts were made to use hydrogen as fuel in jet engines. In the late 1980s, for instance, a three-engined Tupolev TU154 fueled with liquid hydro-

gen and liquid natural gas proved especially popular. Hydrogen's biggest advantage is its energy content in relation to its weight: At the same energy content, hydrogen is 2.8 times more lightweight than kerosene – but also 4.1 times more voluminous. Hydrogen's large volume and the need to cool it to minus 253 degrees Celsius imply a momentous challenge, as the aircraft's entire architecture would have to be changed accordingly.

Should hydrogen ever be used as a fuel in aviation, an entirely new supply infrastructure would also have to be constructed. Current fueling systems, hydrant systems, pipelines and supply tanks at airports are all optimally adapted for the use of oil-based kerosene. Should an alternative fuel such as hydrogen require a system change, parallel supply infrastructures for the old and the new fuels would have to be made available at airports worldwide during a transition phase. And aircraft's long life spans would lead to correspondingly long transition phases.

#### **Option 5: LNG and biogas**

The use of liquefied natural gas (LNG) places similar demands on aircraft design. This type of fuel must also be cooled. And in relation to its weight, LNG does not have even half the energy content of hydrogen. On the other hand, its energy content is greater than that of conventional kerosene. However, the IPCC (Intergovernmental Panel on Climate Change) reaches the conclusion that methane (LNG or biogas) provides a less favorable result energetically than kerosene. As a result, the intergovernmental committee set up by

the United Nations Environmental Program (UNEP) and the World Meteorological Organization (WMO) have dismissed this option.

### **Kerosene conservation helps secure crude oil reserves and reduces CO<sub>2</sub> emissions**

To secure the world's limited crude oil reserves, the most obvious alternative for the time being remains the conservation of kerosene. The very best example for this approach is the continuous modernization of the Lufthansa fleet. New aircraft consume less fuel and reduce the output of emissions at the same time. Beyond this, Lufthansa counts on a broad spectrum of conservation measures in daily operations. These include adapting flight speeds, implementing more direct routes in Asian airspace, and reducing the service-related weight on aircraft. The airline achieves the latter, for example, by installing more lightweight seats on the aircraft of its European fleet and by more accurately adapting the quantities of reserve fuel and freshwater carried to actual needs.

The figures substantiate the airline's success in this area: Since 1991, Lufthansa has increased its efficiency by about 30 percent. In the same period, its specific fuel consumption has declined by almost 2 liters per 100 passenger kilometers. If the Lufthansa Passenger Airlines had produced their 2006 transport performance with their 1991 fleet, they would have consumed almost 1.9 million more tons of kerosene and emitted 5.9 million more tons of carbon dioxide. Viewed over a longer term, this efficiency gain becomes even more pronounced: While in the 1970s aircraft consumed 12 liters to carry one passenger over a distance of 100 kilometers, today a Lufthansa Airbus A340-600 burns only 4 liters to do the same job. And Lufthansa's new flagship, the Airbus A380-800, is expected to lower this value by about another 15 percent to around 3.4 liters.

Global warming and climate change make fuel conservation and the search for plausible alternatives all the more urgent, as kerosene consumption causes CO<sub>2</sub> emissions that are harmful for the Earth's climate. Lufthansa counts on sustainable business development and has therefore adopted numerous measures and developed innovative ideas to limit CO<sub>2</sub> emissions more strongly. At the same time, the political process can also help conserve more kerosene and thus limit emissions. By creating a standardized European airspace and improving air traffic management, up to 12 percent of the kerosene used in the skies above Europe could be conserved. Nevertheless, Europe's politicians are quite slow to tackle this long-standing demand on the part of its airlines.

### **Best alternative: BTL**

The overview of kerosene's alternatives shows there is no simple substitute solution. A switch to hydrogen as aviation's preferred fuel would imply that the industry would have to change its entire supply system on the ground as well as aircraft structures. "The big challenge, therefore, is to find a fuel that avoids an extremely costly system conversion, but still offers a viable alternative to kerosene," says Haag, the head of Group Environmental Concepts.

"The challenge is to find a fuel that avoids an extremely costly system conversion. From an ecological perspective, BTL would be the best alternative for Lufthansa."

Dr. Karlheinz Haag, Head of Group Environmental Concepts



cepts. "We have to find a fuel that fulfills the specifications of kerosene exactly. From an ecological perspective, BTL would be the best alternative for Lufthansa."

The study by the German Energy Agency also concludes that over the mid-term an increasing share of jet fuel will be synthesized from coal, natural gas and biomass. This would be "a realistic alternative." The clear advantage of this fuel is that it is almost completely compatible with the aircraft propulsion systems and supply infrastructures currently in use, says the study. In addition, the greenhouse gas emissions from BTL are significantly lower than those of kerosene.

It will be a number of years, however, before the use of BTL is an economic and technological possibility over a wide geographical area. According to the German Energy Agency, further steps on the part of industry and politics are necessary to make large-scale BTL production economically feasible and to take full advantage of the technology's potentials. Recommended control instruments would be increased support for research and development on the one hand, and reliable political and fiscal conditions on the other. "During this transition period, the air transport industry must reduce its kerosene consumption further by means of improvements, such as in the area of engine technology," Haag emphasizes. He also forecasts: "By 2025, synthetic fuels could cover as much as 20 percent of the needs of the world energy market." ●

## Environmental management

## Environmental care has a long tradition

Lufthansa always strives to maintain a balance between economy and ecology that is favorable for all sides. For this reason, environmental care has long been a tradition at Lufthansa and is one of its highest priority corporate goals. Since 1995, all relevant departments and wholly-owned subsidiaries have had Environmental Commissioners or contact partners for environmental issues. Group-wide guidelines concerning environmental care have been in use since 1996. They ensure that all Group companies consistently pursue the identical goal of environmental protection.

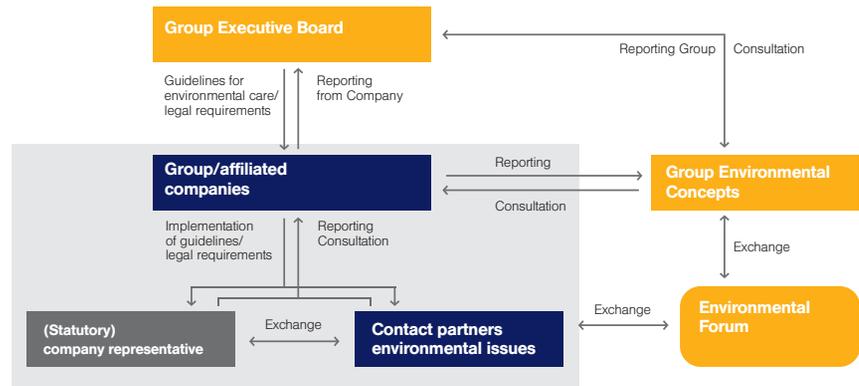


Diagram of procedures and processes for environmental matters within German Group companies with environmental relevance and a Lufthansa majority interest.

The Group Executive Board bears the full responsibility for Lufthansa’s fulfillment of environmental care tasks. In doing so, it is supported by the Head of Group Environmental Concepts and his department, which coordinates Group-wide environmental goals, strategies and measures. There are about 25 Environmental Issues Contact Partners at the various German subsidiaries of the Lufthansa Group. They meet at regular intervals at the Environmental Forums, where they discuss goals and activities in the area of environmental care, develop joint strategies and exchange experiences.

Lufthansa systematically captures, documents and verifies all business activities and processes with an impact on the environment. The foundation of its environmental management is a comprehensive sustainability database. Every year, it stores the current data from all Group companies concerning kerosene and energy consumption, emissions, noise, waste, freshwater consumption and wastewater volumes. Additionally, the database comprises selected personnel and economic data. Lufthansa’s environmental experts generate informative statistics from the concert of this information, which help improve the Group’s environmental performance continuously.



Committed to environmental care: The members of Lufthansa’s Environmental Forum regularly share their experiences.

Over the last two years, Lufthansa has optimized the technological side of its database. Now, data are captured much more efficiently and in part automatically. In addition, the options for analysis have become appreciably more flexible than they were in the previous system. “We’ve gained more free hand to expand our sustainability reporting and to make it more powerful,” explains Dr. Andreas Waibel, who heads this project. Today, the Group’s environmental experts can call up the information they need for detailed reports, such as fuel consumption or emissions, at any time by means of a few mouse clicks.

In the area of public communications, the Internet has become increasingly important. Lufthansa takes this development into account by presenting sustainability issues on the Internet in a format updated in 2006: At <http://responsibility.lufthansa.com> those interested find comprehensive, current information about the Group's activities in the areas of ecology, social responsibility and corporate citizenship. In addition, this report *Balance* has been covering the topics of air transport and sustainability at Lufthansa for the last 13 years.

In the certification of its environmental management systems, the company continues to occupy a top position within the aviation industry. In 2006, the environmental management system of regional subsidiary Lufthansa CityLine was revalidated according to the European eco-audit regulations EMAS and recertified according to the internationally accepted environmental standard ISO 14001. This makes CityLine one of the two airlines worldwide whose environmental management has been verified according to both EMAS and ISO 14001.

#### **Lufthansa Technik – a pioneer in quality management**

In 1996, Lufthansa Technik became the first company in the aircraft maintenance industry to introduce an environmental management system on the basis of EMAS. The certification according to ISO 14001 followed three years later – in accordance with the wishes of its international customers. In addition, Lufthansa Technik is the first company in the MRO (Maintenance, Repair and Overhaul) industry to operate an integrated quality management system that covers the areas of quality, environment and job safety and that corresponds to international standards. Its basis is the newly-developed documentation system IQ MOVE, which gives employees swift and easy-to-use information about all public and operational requirements (see article "IQ MOVE: Documentation with brains" on → page 67).

#### **Standardized handling of hazardous substances**

In the context of the quality management system, Lufthansa Technik also regulates its handling of hazardous substances. As far back as 1996, the aircraft maintenance provider adopted a company-wide policy for hazardous substances to ensure a consistent way of dealing with substances that pose a risk for health or environment. Lufthansa Technik uses about 4,000 chemical products, such as paints, varnishes, cleaning agents, glues and plasma powder. Before substances are introduced, experts thoroughly check every single one for its tolerability for humans and the environment. Particularly dangerous substances are ordinarily barred from use. "By means of this system, we can determine the danger potential of every single substance our colleagues come into contact with. In this way, we are able to implement the necessary protection measures early on," explains Bernd Schröder, who is responsible for job safety at Lufthansa Technik. "In addition, we check regularly if less hazardous substances might be available as a result of technological developments. Naturally, these have to meet the same stringent safety standards."

With GIS, its information system on hazardous substances, the Lufthansa subsidiary also created a centralized registration and information medium for hazardous substances that is available to employees worldwide via the intranet. GIS informs them fully about the risk potential of specific substances and their correct handling. For 2007 Lufthansa Technik plans to tie its international subsidiaries into this system as well.

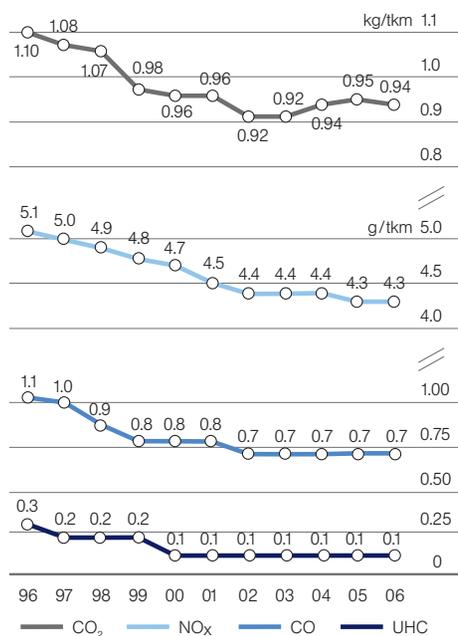
**Environmental goals and measures concerning environmental management** are found on → page 70.

## Kerosene and emissions

Fuel consumption absolute		changes compared to 2005
<b>Kerosene passengers</b>	5,546,888 tons	+ 1.8 %
<b>Kerosene freight</b>	1,393,699 tons	+ 6.9 %
<b>Kerosene total</b>	6,940,587 tons	+ 2.8 %

Emissions from flight operations absolute		changes compared to 2005
<b>CO<sub>2</sub></b>	21,890,614 tons	+ 2.8 %
<b>NO<sub>x</sub></b>	99,808 tons	+ 2.6 %
<b>CO</b>	15,658 tons	+ 2.3 %
<b>UHC</b>	1,902 tons	+ 1.7 %

**Specific emissions in flight operations**  
in kilograms, grams/ton kilometer



## Specific kerosene consumption has declined significantly since 1991

Air transport connects people around the world. Globalization would be unthinkable without these transport services. For the time being, air transport will continue to depend on kerosene as its key energy source to carry passengers and goods. This fuel is still based virtually exclusively on the finite resource of crude oil (see article "When kerosene becomes scarce ..." on → page 52). In addition, the combustion of fuels from fossil energy sources increases the atmosphere's CO<sub>2</sub> content. Lufthansa is well aware of these facts. That is why it has long been a tradition at Lufthansa to use the Earth's resources carefully and to lighten the burden on the environment at the same time. From 1991 to the end of 2006, Lufthansa's passenger fleets reduced their specific fuel consumption by 29.3 percent. In this way, the company has also avoided an appreciable quantity of CO<sub>2</sub> emissions and made an early contribution to climate protection.

At Lufthansa, past success has always been an incentive to redouble its efforts to protect the environment: The airline has set itself the goal of reducing the specific kerosene consumption of its passenger fleets by 33 percent below 1991 levels by 2008. And this same value is to be reduced by as much as 38 percent by 2012.

By modernizing its fleet at regular intervals, Lufthansa has also been successful at continuously decoupling its transport performance from its environmental effects since 1991: Transport performance rose by 231 percent from 1991 to 2006, while kerosene consumption and CO<sub>2</sub> emissions only rose by just under 122 percent over the same period. Thus, the Group realized about half of its growth without burdening the climate with additional CO<sub>2</sub>. In 2006, for example, the transport performance in passenger carriage increased by 2.0 percent over the preceding year, while specific fuel consumption decreased slightly to 4.38 liters per 100 passenger kilometers over the same period.

### Less than 4 liters of kerosene per 100 passenger kilometers

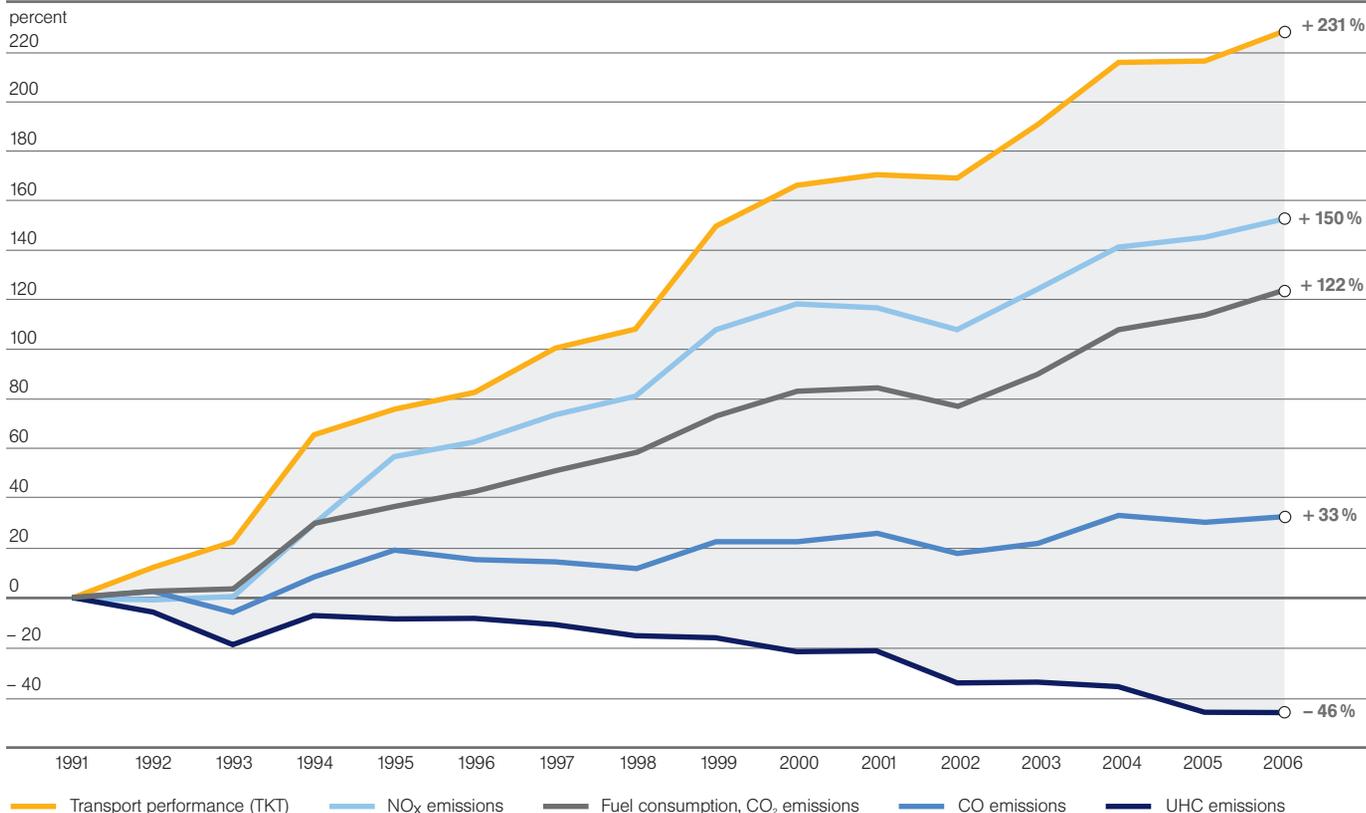
The Lufthansa Group's most fuel-efficient aircraft in 2006 was the Airbus A340-600: On average, this aircraft needed only 3.99 liters of kerosene per 100 passenger kilometers, which corresponds to CO<sub>2</sub> emissions of 10.1 kilos per 100 passenger kilometers (see also bar charts "Specific fuel consumption by type of aircraft" on → page iv and "Specific CO<sub>2</sub> emissions by type of aircraft" on → page iii).

Despite the increase in the transport performance, the specific emissions of carbon dioxide, carbon monoxide (CO) and unburned hydrocarbons (UHCs) from Lufthansa's aircraft remained at the previous year's levels, while their emissions of nitrogen oxides (NO<sub>x</sub>) even sank to the lowest value in the company's history. With regard to NO<sub>x</sub>, the decision related to CAEP/6 concerning new engines means that a new and more stringent limit formulated by the International Civil Aviation Organization (ICAO) will go into effect on January 1, 2008. Today, 88.3 percent of Lufthansa's jet aircraft already fulfill this limit (see also bar chart "NO<sub>x</sub> emissions by type of aircraft in comparison with the future CAEP/6 limit in percent" on → page iii).

Kerosene is one of the most important cost items for airlines. For this reason, Lufthansa bundles economic and ecological concerns in its goal of conserving a maximum quantity of kerosene. The basis for success in this area is a fleet that is kept constantly at the leading edge of technology (see article "A fleet for the future"

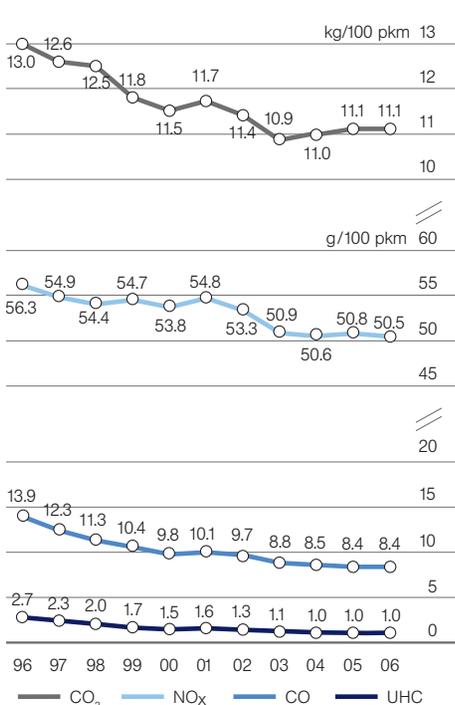
**Decoupling of transport performance and environmental burden**

Change compared with 1991 in percent, values for the fleet of the Lufthansa Group



**Specific emissions in passenger transportation**

in kilograms, grams/100 passenger kilometers

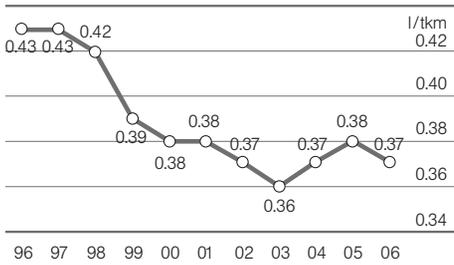


on → page 20). This is complemented by numerous efforts in operations, such as flying at variable speeds, which allows long-haul aircraft to take better advantage of prevailing winds. Furthermore, Lufthansa strives to keep the weight load aboard its aircraft to a minimum. This also includes the installation of more lightweight seats on the entire European fleet, which was concluded successfully in 2006 (see examples for energy and resource management on → page 67). Additional significant savings potentials are opened up by more direct flight routings particularly in Asian airspace.

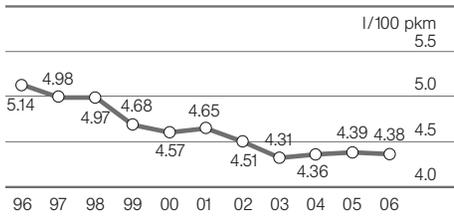
**Four pillars for climate protection**

Given that climate change is looming on the horizon, measures to conserve kerosene go hand in hand with the necessity of increasingly limiting worldwide CO<sub>2</sub> emissions. Therefore, Lufthansa has cooperated with other airlines in developing a four-pillar model for climate protection, which covers the entire range of practicable measures: technological and operational activities, infrastructure improvements and – as a complement to these efforts – economic instruments. According to the statements contained in the strategic research agenda of the Advisory Council for Aeronautics Research in Europe (ACARE), it is possible to reduce CO<sub>2</sub> emissions by 50 percent and NO<sub>x</sub> emissions by 80 percent per passenger kilometer by 2020 by means of technological, operational and infrastructure-related improvements.

**Specific fuel consumption in flight operations**  
in liters/ton kilometer



**Specific fuel consumption in passenger transportation**  
in liters/100 passenger kilometers

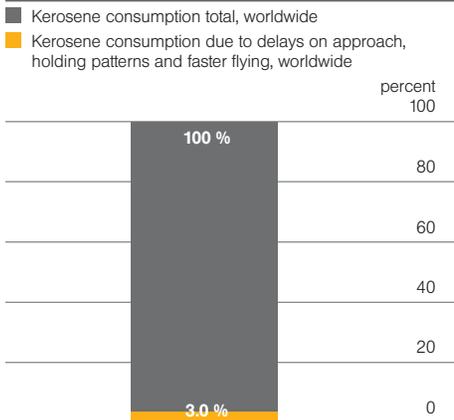


**Fuel dumps**

changes compared to 2005

<b>Events, total</b>	42	+ 17
<b>Quantity, total</b>	1,280 tons	+ 96.0%
<b>Medical reasons</b>	12	+ 4
<b>Technical reasons</b>	29	+ 12
<b>Other reasons</b>	1	+ 1

**Kerosene consumption due to infrastructure bottlenecks**



Shown is the share of kerosene consumption due to delays on approach, flying in holding patterns and flying at higher speeds to compensate for delays due to infrastructure bottlenecks in the air and on the ground. The additional consumption due to these factors amounts to 142,000 tons. All data refer to the worldwide operations of the Lufthansa Passenger Airline.

**Pillar 1: Technological progress**

Thanks to technological innovation, the air transport industry has already cut its specific kerosene consumption and CO<sub>2</sub> emissions by 70 percent since 1970. If technical advances in the areas of fuselage surfaces, aerodynamics, materials, engines and electronics were more strongly supported and implemented, further significant reductions would be possible in the future. The use or addition of alternative fuels is also likely to yield further success in the future. Here the goal must be to drive the implementation forward to a marketable product (see article “When kerosene becomes scarce ...” on → page 54).

**Pillar 2: Improved infrastructure**

Infrastructure improvements on the ground and in the air open up a considerable conservation potential. The biggest opportunities are associated with the optimized use of airspace and the need-oriented expansion of airport infrastructures. In 2006, Lufthansa Passenger Airline alone consumed about 142,000 tons of kerosene worldwide as a result of delays on approach, holding patterns and flying faster to compensate for delays resulting from infrastructure bottlenecks in the air and on the ground. This is equal to 3.0 percent of the kerosene that this fleet needed for all its flights. By optimizing air traffic management and implementing a Single European Sky, which would eliminate unnecessary detours for aviation, up to 12 percent of kerosene and CO<sub>2</sub> could be saved, according to the Intergovernmental Panel on Climate Change (IPCC).

**Pillar 3: Operational measures**

As explained above, operational measures do their part as well to further limit fuel consumption and emissions. Using more efficiently-sized aircraft, flying optimum routes and at optimal speeds and applying improved processes on the ground are just a few examples of such measures. In 2006 alone, Lufthansa was able to spare the environment a burden of about 200,000 tons of CO<sub>2</sub> through these and similar efforts.

**Pillar 4: Economic measures**

As a complement to the three other pillars, which must have much the same priority, a trading system for emissions rights could be employed. For ecological reasons and to ensure fair competition – which does not disadvantage the European aviation industry – such a trading system should be implemented on as global a scale as possible. For these reasons, Lufthansa rejects a trading system limited to intra-European air transport.

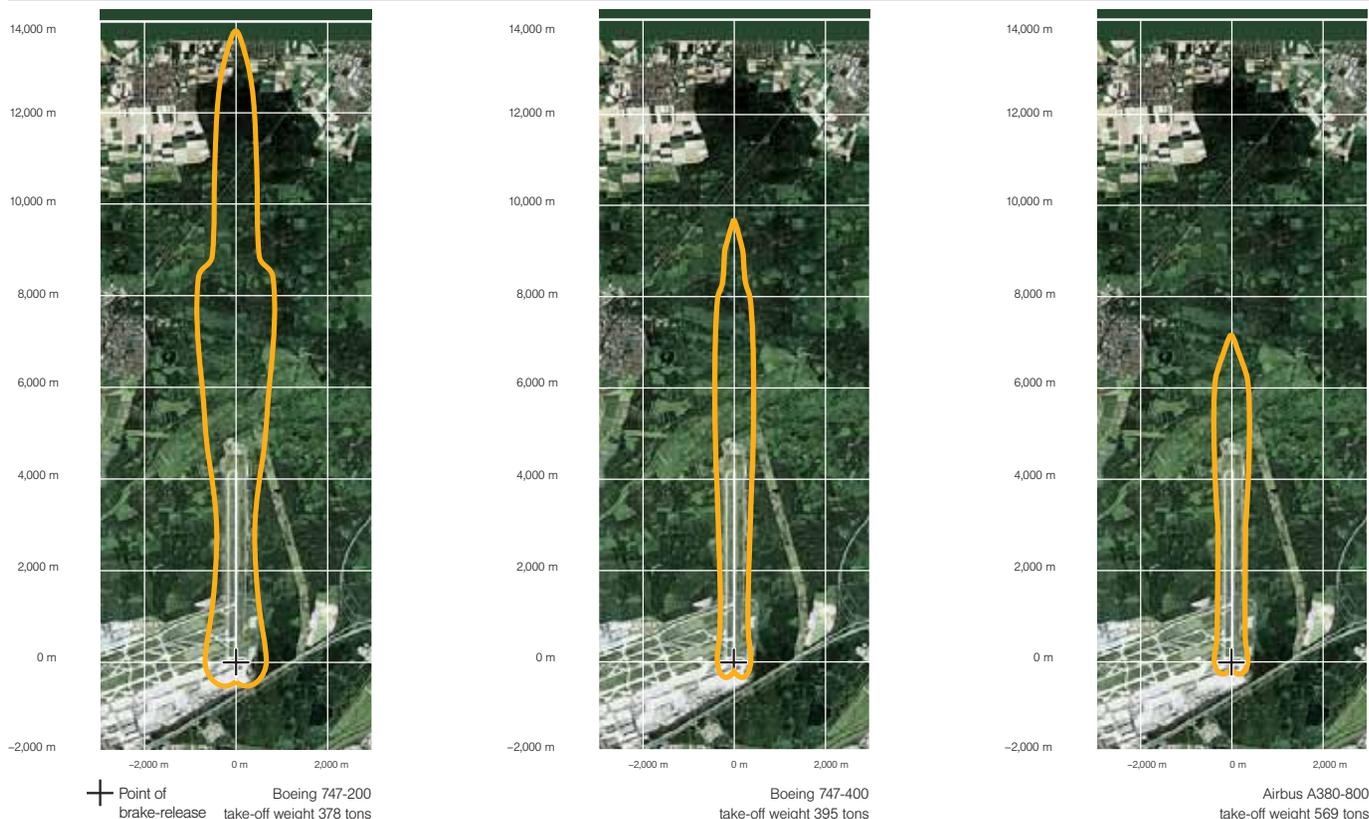
For each of these pillars, there is at least one department at Lufthansa that is responsible for the related procedures and processes. All relevant information is gathered by the department Group Environmental Concepts to be analyzed and processed. On the basis of these results, Lufthansa’s environmental experts determine and develop the next steps to open up more opportunities for the Group to conserve kerosene and avoid emissions.

**Fuel dumps: Safety first**

To ensure the safety of passengers and crews, fuel dumps under exceptional circumstances cannot be avoided. Given the high level of technical aircraft maintenance, they occur exceedingly rarely at Lufthansa. Yet no airline in the world is entirely free of them. Whenever pilots are forced to make an unscheduled landing for technical or medical reasons, they first need to empty the fuel tanks until the aircraft’s maximum permissible landing weight is reached. Fuel dumps affect only long-haul flights, as short- and medium-haul aircraft are able to land fully loaded and with full tanks.

**Environmental goals and measures concerning fuel consumption and emissions** are found on → page 69.

**Comparison of noise footprints**  
 B 747-200, B 747-400 and A380-800



Shown are the maximum noise footprints for one takeoff each at the take-off weight indicated. Within the respective contours, a maximum noise level of 85 dB(A) is either reached or exceeded. For comparison: A maximum noise level of 85 dB(A) is produced by a truck passing by in city traffic at a distance of 5 meters.

**Noise emissions**

**A milestone in noise research**

Noise is generated, above all, when aircraft take off and land. While this cannot be avoided, it can be reduced to a bearable minimum. Lufthansa pursues two approaches to further reduce the noise emissions of its aircraft: First, the airline pays special attention to acquiring particularly quiet aircraft in the framework of fleet modernizations. Second, it works continuously on developing measures to reduce the noise emissions of its current fleet.

Research projects investigating noise sources on the aircraft itself play an important role in this quest. And it is in this area that Lufthansa and German Aerospace Center (DLR) made a decisive step forward in early October 2006: At Schwerin/Parchim Airport, the partners successfully measured the noise generated by an overflying Airbus A319 for the third time. Along a corridor about 40 kilometers long and 5 kilometers wide, a total of 26 microphones recorded the noise from different take-off and landing procedures. These research flights marked the project's successful conclusion.

“These measurements are a unique milestone in noise research to date,” asserts Dr. Gerd Saueressig, project manager at Lufthansa, with regard to the importance of these research flights. The recorded data serve to verify a DLR-developed simulation program that will help analyze flight procedures more accurately. Simulation methods offer numerous advantages over test flights as a means of testing new take-off and landing procedures. For example, weather conditions vary from flight to

flight, which makes it more difficult to compare test results. Given the many possible variations in take-off and landing procedures, significant time, cost and environmental protection considerations also speak in favor of calculating flight noise by means of modern simulation programs. In this way, experts can investigate in advance the various flight procedures by computer, evaluate them and sift out the quietest variants.

Research-backed solutions to reduce noise can only be developed if the characteristics of individual noise sources are known. A number of factors play a role here: These include flight speed, aircraft mass, engine performance, slat and flap settings, and the position of landing gear. In addition, the influence of wind and temperature profiles on the spreading of noise must be known. "Only in-depth knowledge of a noise source's generation mechanism and characteristics will allow experts to depict that noise source as accurately as possible in a model," explains Saueressig. The joint efforts of the DLR, universities and industry partners under the umbrella of the research network "Quiet Traffic" are the decisive factor in achieving audible results in noise research in the future.

In the context of the research project LAnAb (Noise-optimized approach and departure procedures), which is supported by Germany's Federal Ministry of Economics and Technology, the first noise measurements took place in 2004. The noise-source data recorded at that time have also flowed into the development of the simulation program. Lufthansa plans to use this program jointly with the DLR in the future as well and to continue its development. The two partners have submitted a proposal to the Federal Ministry of Economics and Technology for a follow-up project in the context of the 4th National Aviation Research Program (LUFO4).

For further information on this subject see the article "Research at Lufthansa: Securing the future" on → page 72 and on the Internet at: [www.fv-leiserverkehr.de](http://www.fv-leiserverkehr.de)

**Environmental goals and measures concerning noise emissions** are found on → page 70.

## Intermodal transport

## It all depends on the mix

### Combination road-and-rail transport

Lufthansa strives resolutely to lighten the burden on the environment. So intermodal transport – the intelligent linking of different transport modes – has an important place in the corporate policies of the Group companies, including Lufthansa Cargo. Since 2002, the logistics company has sent part of its consignments by combined rail-and-road transport to their destinations. In 2006, the Lufthansa subsidiary used scheduled rail services 43 times per week, loading trucks that started their journey in Frankfurt onto trains in Freiburg (southern Germany) or Wörgl (Austria) to continue their trip in an environmentally friendly way. Once they arrive in Novara or Trento (both in Italy), the trucks continue by road to their destinations, Milan and Venice. Lufthansa Cargo uses the intermodal road-and-rail transport not only for regular shipments, whose carriage the railway company guarantees. If there are available capacities, ad hoc shipments also make a "pit stop" on the rails. An average of 55 trips per week – or 2,860 shipments per year – were sent by intermodal transport in 2006. This corresponds to a 3-percent share of Lufthansa Cargo's total European freight volume. In this way, about 750,000 road kilometers can be avoided every year.



AIRail – the intelligent linking of different modes of transport.

### **AIRail, Rail & Fly and Lufthansa Airport Bus**

And Lufthansa is committed to additional intermodal projects. These include AIRail, a service the company has offered since 2001 in cooperation with Deutsche Bahn and Fraport, the operator of Frankfurt Airport. Its goal is to shift the capacities of short-haul flights between Frankfurt and Cologne as well as Frankfurt and Stuttgart to the rails in order to reduce emissions and kerosene consumption. AIRail gives passengers the option of receiving the boarding passes for their onward air travel from Frankfurt at the Lufthansa check-in counters in the central stations in Cologne and Stuttgart. In addition, they can check in their baggage for their entire trip. Thanks to 26 daily train connections between Cologne and Frankfurt alone, Lufthansa has been able to reduce its flight program by two of six daily flights between the two cities.

Beyond that, Lufthansa is aiming at an expanded sales cooperation with Deutsche Bahn in the framework of Rail & Fly. Already today, passengers travel by rail at advantageous fares to and from their international connecting flight, and that from any point in Germany. Passengers can select freely among the IC and ICE train connections available for this service.

Another example of environmentally friendly intermodal transport is the Lufthansa Airport Bus. Its 12 daily services between Strasbourg and Frankfurt appreciably reduce the number of air passengers. And during the summer months, the number rises to 14 services a day. As the Lufthansa Airport Bus uses alternative fuels, it is significantly more environmentally friendly than conventional buses. With the Lufthansa Airport Shuttle, the airline also serves the route from Mannheim and Heidelberg to Frankfurt Airport by bus. The same type of feeder service is also available from points in southern Germany and Austria to Munich Airport and back – in cooperation with different bus operators.

### **time:matters**

The provider of logistics services time:matters also helps to lighten the burden on the environment. This Lufthansa Cargo subsidiary combines transport by aircraft, train and van to get courier shipments to their destinations. Since 2005, the company has also worked with bicycle couriers, who pedaled their way to customers in 18 of Germany's larger cities in 2006.

**Environmental goals and measures concerning intermodal transport** are found on → page 70.

## **Energy and resource management**

### **Everyday operations at Lufthansa**

Conducting business according to the principles of sustainability and using natural resources in a careful manner are part of everyday operations at Lufthansa. The Group's environmental experts and employees alike are always aware of the need to make operative processes as environmentally compatible as possible. This year, selected examples from daily practice again give insights into potentials for energy and freshwater conservation at Lufthansa and its subsidiaries.

#### **Training Center Seeheim: Saving energy with geothermal energy**

For Lufthansa, sustainability is not limited to airports. The company seizes all opportunities for environmentally compatible conduct – including the reconstruction of its Training Center in Seeheim. "We place great emphasis on environmentally friendly construction methods and resource-conserving operations for the new building," underlines Lufthansa project coordinator Nadjeschda Tyllack. Thus, the landscaped

areas around the building are to be watered from a rainwater collection basin. And optimal insulation ensures that precious heating energy is used as efficiently as possible.

But from an ecological perspective, the highlight here is the geothermal energy system. Its geothermal reservoir consists of 120 probes placed in drill holes each 99 meters deep. In winter, a heat pump absorbs the Earth's warmth and, using electricity, feeds it into the building's heating system at a higher temperature. The key advantage: For 100 percent of heat only 25 percent of electricity is needed, which also translates into significantly reduced CO<sub>2</sub> emissions. During periods of peak loads – when the external temperature drops to minus 12 degrees Celsius, for example – the geothermal system will provide about 35 percent of the heating output, with the balance being covered by natural gas. But that is not all: During the warm summer months, cold water from the geothermal reservoir will cool the building. "Assuming today's energy prices, the system will be amortized in only about ten years," says Jürgen Bommersheim at Lufthansa Purchasing. "This proves yet again that ecology and economy do not have to be opposites."

The deconstruction of the old building was completed in spring 2007; the new building is expected to be ready for use at the end of 2008. Before the building goes up, however, energy experts are once more running the new training center through computer-based simulations. "In this way, we are checking if any further energy-savings might be realized in the building," says Nadjeschda Tyllack.

#### **CCT maintenance hangar: Hard shell, environmentally friendly core**

Saving energy is also a top priority at Condor Cargo Technik (CCT). With this goal in mind, the wholly-owned subsidiary of Lufthansa Technik AG had a particularly energy-efficient aircraft hangar built at Frankfurt Airport – Europe's largest hangar without internal supports. Since November 2005, this architectural masterpiece has housed the maintenance and overhaul work on Boeing 757, 767 and MD-11F aircraft. It is above all the "internal values" of this hangar that impress: Its roof – 175 meters long and just under 80 meters wide – is equipped with a so-called "thermoactive ceiling," which contains a sophisticated heating and cooling system. Its integrated coils can be fed with cold or hot water, depending on the weather. "Depending on the external temperature, the thermoactive ceiling provides the offices and workshops with the exact quantity of cool or warm air needed," Silvia Hinkel-Sus, Infrastructure and Environmental Commissioner at CCT, summarizes the system's advantages. Should heating costs continue to rise, the combined heating and cooling system can be refitted with a geothermal heat pump. With high efficiency and low emissions, such a system is able to tap into the heat energy stored in the soil and "pump" it to the higher temperature level needed for heating, even when the mercury drops during the winter months.

When it comes to water consumption as well, Condor Cargo Technik writes resource conservation in "all caps." Thus, its new maintenance hangar is equipped with a water recycling network, which supplies not only the toilets, hydrants and sprinkler systems but also the water used to wash aircraft. "So wastewater from aircraft washings passes first through a treatment facility and is then fed back into the recycled water circuit," explains Silvia Hinkel-Sus. In 2006 alone, CCT was able to conserve 1,662 cubic meters of freshwater in this way. And dry cleaning aircraft takes no water at all: CCT uses this environmentally friendly procedure to clean the Boeing MD-11Fs. In 2006, it was used for a total of five of 34 aircraft cleanings.

### **IQ MOVE: Documentation with brains**

Energy and resources can be saved not only in the air but also on the ground – when dealing on a daily basis with the regulations pertaining to environmental protection and employee safety, for instance, or when implementing quality management. Since 2005 the employees of Lufthansa Technik have been able to perform such tasks quickly, securely and in a process-oriented manner, thanks to the intranet application “IQ MOVE.” This innovative documentation system replaces the numerous process manuals and quality management handbooks by bundling all this documentation into a single system. Since its introduction, three interlinked databases administrate and interpret all requirements, processes and documents. In this way, IQ MOVE reduces the research and coordination efforts of employees, technicians and managers to a minimum. “The time savings due to IQ MOVE is enormous,” says Susanne Lohse, project manager for integrated certification at Lufthansa Technik’s quality management. “Before, employees had to work their way through a multitude of documents, while today a few mouse clicks are enough to get all the information they need.” In addition, IQ MOVE boosts the safety of processes and the competence of employees’ actions.

That this documentation and research tool goes down well is proven by its unqualified acceptance among the company’s technicians, who provided valuable suggestions for improving the software. But IQ MOVE also serves as the technological basis for Lufthansa Technik’s leading-edge management system. The latter integrates environmental protection and employee safety regulations in addition to industry-specific quality requirements. In 2006, this system was audited and certified by independent experts. This makes Lufthansa Technik the first company in the MRO industry (Maintenance, Repair and Overhaul) with an integrated certification according to EN ISO 9100/9110 (quality), EN ISO 14001/EMAS (environment) and OHSAS 18001 (employee safety). “The certification is a quality seal for the services offered by Lufthansa Technik,” says Ralf Wunderlich, who accompanied the certification process as Project Manager Environment and Employee Safety. “By integrating environmental protection and job safety into our quality management system on the basis of IQ MOVE, we respond to the preferences of our international customers.”

### **Flyweight: Lufthansa bets on more lightweight aircraft seats**

Lufthansa Passenger Airline takes advantage of all opportunities to conserve energy. So the airline has installed considerably more lightweight seats on the 145 short- and medium-haul aircraft of its European fleet – in Business Class and Economy Class alike. The new three-seat units do more than give passengers clearly improved seating comfort and legroom: At 38 to 48 kilos each, these “flyweights” weigh about 5 kilos less than their predecessors. “Lufthansa has exchanged a total of 20,717 seats in 2006,” says Dr. Reinhold Huber, head of Product Management and Innovation at Lufthansa. The lower weight contributes to an appreciable reduction in fuel consumption and pollutant emissions from Lufthansa’s continental fleet: Every year, about 5 million liters of kerosene can be conserved in this way.



The new seats on Lufthansa’s European fleet not only offer appreciably more seating comfort but also help to lower fuel consumption by weighing less.

Lufthansa does not limit the development and installation of more lightweight seats to its European fleet, however. “Our 81 long-haul aircraft, which fly mostly on routes to Asia and North America, have been equipped with new Business Class seats,” adds Dr. Reinhold Huber. Passengers on these routes now enjoy the so-called “PrivateBed,” a completely new development of a sleeper seat that folds out to a length of 2 meters. Featuring an incline of only 9 degrees, it offers air travelers an almost horizontal sleeping position. These “heavenly seats” convince not only by offering

considerably more comfort and the highest degree of user-friendliness when adjusting the desired seating position and operating the onboard entertainment program – they also weigh 25 to 30 percent less than comparable seats on other airlines, thanks to materials such as titanium, aluminum and plastics reinforced with carbon fiber. Their electricity consumption is pretty remarkable as well: At 150 watts, each seat consumes no more energy than the average lighting for a single room. These high-tech seats were under development for more than two years, and valuable suggestions from Lufthansa customers were incorporated in their design. From 2008, passengers traveling in Economy Class and First Class will also be sitting comfortably in new seats.

#### **A clean deal – Engine cleanings at Lufthansa Technik**

Lufthansa Technik (LHT) has developed an especially efficient procedure for cleaning aircraft engines. This method – a further development of the on-condition engine cleanings that have been established at Lufthansa Technik for many years – considerably reduces the time it takes to clean engines and lessens the burden on the environment. The reason: Less water and cleaning agent remain inside the engine thanks to the new cleaning method. So time- and energy-consuming run-ups are no longer needed. These run-ups used to be necessary to dry the engines, but they consume kerosene and cause CO<sub>2</sub> emissions. Under the new method, a specially developed and patented device injects a cleaning agent heated to 70 degrees Celsius directly into that part of the engine which drives the fan (the core engine) at a pressure of 60 bar. This highly accurate application of the liquid mixture means there is no loss from scattering and the quantity used can be dosed most exactly. The result: comparable or even better cleaning results, with less cleaning agent.

“The results of routine engine cleanings and the one-year test phase involving selected engines on Airbus A321s, A340-300s and Boeing MD-11Fs are clear: Regular engine cleanings can lead to fuel savings of about 0.5 percent for the entire Lufthansa fleet,” says Manfred Paul, group manager at Engine Engineering at Lufthansa Technik. In addition, the new method makes it possible to clean engines more frequently, which increases their performance and life span. “Now, we expect 1,200 engine cleanings instead of 200 per year,” Paul adds.

Initially, the new method is to be used only on Boeing 737s and 747s as well as Airbus A319s and A320s. From midyear, it will be expanded step by step to all aircraft in the Lufthansa Passenger Airline fleet. Calculations show that engine cleanings will then help avoid more than 74,000 tons of CO<sub>2</sub> emissions per year. The patented procedure has been introduced since April 2007 at all German locations of Lufthansa Technik and in Brussels. Yet regular aircraft engine cleanings do more than reduce kerosene consumption and CO<sub>2</sub> emissions: The 100 to 200 liters of water needed for each cleaning are also collected almost entirely and disposed of in environmentally compatible ways. To further optimize the process, Lufthansa Technik is currently developing a concept for recycling this water. Since January 2007, Lufthansa Cargo has been cleaning the engines of its MD-11F fleet at fixed intervals and will switch to the new method from midyear.

**Environmental goals and measures concerning energy and resource management** are found on → page 71.

## Environmental goals and measures

 Goal reached
  Not reached
  Goal remains valid
  New goal

### Fuel consumption/Emissions

Key environmental goals	Environmental measures	Degree of attainment	Status
<b>Reduce specific fuel consumption of the passenger fleets by 33 percent below 1991 levels by 2008, and by 38 percent by 2012. Achieve related reduction in specific emissions of pollutants.</b>		From 1991 to 2006, the Group's passenger fleets achieved a specific reduction of 29.3 percent. Thus, 89 percent of the reduction goal set for 2008 has already been achieved.	
	Acquiring and operating modern and environmentally compatible types of aircraft.	Starting in 2008, 7 A340-600s and 5 A330-300s will be added to the long-haul fleet, and from 2010 20 new Boeing 747-8s will be phased in. Additionally, 15 A380s will be delivered from 2009. From 2007, 5 Airbus A319s, 10 Airbus A320s and 15 Airbus A321s will reinforce the short- and medium-haul fleet. Beginning in 2008, 30 regional aircraft of the Embraer 190 family and 15 Bombardier CRJ900 regional jets will join the fleet.	
	Using variable flight speeds to take greater advantage of jet streams and other variables during long-haul flights.	Procedure applied since the beginning of 2005. In 2006, this measure helped conserve about 26,000 tons of fuel. This corresponds to avoiding about 82,000 tons of CO <sub>2</sub> emissions. In 2007, this measure is expected to help conserve about 25,000 tons of fuel.	
	Introducing an optimized reserve fuel procedure, to minimize fuel consumption and emissions of pollutants by determining fuel requirements more accurately.	Launched in February 2006. In 2007, this measure is expected to help conserve about 16,000 tons of fuel per year on Lufthansa flights worldwide. This corresponds to avoiding about 50,000 tons of CO <sub>2</sub> emissions a year.	
	Optimizing the quantities of freshwater carried on long-haul flights.	This measure is expected to help conserve about 1,500 tons of fuel per year; this corresponds to about 4,700 tons of CO <sub>2</sub> emissions. This project is in the coordination phase.	
	Reducing the average kerosene consumption of the continental and intercontinental fleets by flying at lower speeds.	Start of this procedure in March 2006. Initial results are expected in 2007.	
	By actively influencing decision-makers, Lufthansa supports and promotes measures at the national, European and international level that aim at increasing the efficiency of flight operations and airspace utilization: This includes the efforts of the EU member states to create Functional Airspace Blocks (FABs) as a key component of the Single European Sky.	According to the Intergovernmental Panel on Climate Change (IPCC), worldwide improvements in the use of airspace and of Air Traffic Management could reduce CO <sub>2</sub> emissions from aviation by up to 12 percent.	
	Lufthansa supports the Military Variable Profile Area (MVPA) concept, which in the context of the cooperation between civil and military bodies calls for the scheduled provision of variable airspace for military use. Civil aviation benefits from the abolition of fixed military airspace, which currently leads to "detours" in civil flight routings.	A pilot project in the Rostock-Lage region was completed successfully. Further implementation steps are planned for the region around Bremen and the German-Dutch border region.	
	Optimizing flight routings in the Asian region and thus achieving a related reduction in fuel consumption and emissions.	On routes where this procedure has been introduced, about 1 percent of fuel has been saved and emissions reduced accordingly. In 2006, the optimized routes to Canton and Hong Kong led to time savings of up to 20 minutes per flight and reduced fuel consumption by about 3,000 tons per year; this corresponds to a reduction of 9,500 tons of CO <sub>2</sub> emissions. The more flexible airway structure over Russia led to fuel savings of about 800 tons in 2006, and a reduction of about 2,500 tons in CO <sub>2</sub> emissions.	
	Introducing an electronic Departure Management System (DMAN) at Frankfurt Airport.	Reduction of taxiing time at Frankfurt Airport by 15 percent. The goal is to reduce kerosene consumption accordingly.	
	Introducing a new, efficient and cost-effective procedure for regular engine cleanings, which will increase engine efficiency and thus reduce fuel consumption at the same level of performance.	Introduction on a routine basis is planned for the 2nd quarter 2007 at all German LHT locations and in Brussels. A test series showed a resulting fuel savings of 0.5 percent. According to projections, engine cleanings will help the Lufthansa Passenger Airline conserve about 74,000 tons of CO <sub>2</sub> emissions per year.	
	Installing newest-generation seats manufactured by Recaro and B/E Aerospace on the aircraft of Lufthansa's European fleet. These new seats have been specially adapted to Lufthansa's requirements. They weigh less, which will mean a reduction in fuel consumption and related emissions of pollutants for the Lufthansa fleet.	The last aircraft was equipped with the new seats in mid-October 2006. The full fuel savings of 3,750 tons will be realized in 2007 for the first time. This corresponds to avoiding about 12,000 tons of CO <sub>2</sub> emissions.	
	Developing a concept for evaluating statistically the actual quantities of extra fuel required at Lufthansa CityLine; moreover, introducing measures to sensitize pilots to this issue.	Pilots will have a tool at their disposal that will allow them to calculate fuel quantities with greater accuracy. This tool is expected to be available on scheduled flights from mid-2007.	
Developing a concept for equipping the CRJ200 fleet with an automated thrust management system.	Lufthansa CityLine has offered the equipment manufacturer the execution of a scientific study to evaluate the opportunities for launching such a system in the market. The manufacturer's decision is pending.		
Introducing the single-engine taxiing procedure for the regional fleet. After the specified cooling-off time has been observed, one engine is already turned off while taxiing to the parking position and only the remaining engine is used.	Calculations have shown a conservation potential for the regional fleet of about 1,900 tons of kerosene, which corresponds to about 6,000 tons of CO <sub>2</sub> emissions. Introduction in routine operations is planned for 2007.		

**Noise**

Key environmental goals	Environmental measures	Degree of attainment	Status
<b>Reduce noise emissions in the vicinity of airports.</b>	Supporting the use of the Continuous Descent Approach (CDA) to reduce aircraft noise during night-time hours.	The procedure was introduced in 2005 in Frankfurt and used continuously at night in 2006.	▶▶
<b>Launch research and development project to identify noise-reduction options on the aircraft frame and in flight procedures.</b>	Initiating and guiding an interdisciplinary research project (FREQUENZ) in coordination with eight partners from industry, universities and large research institutions. Goal is to develop and validate concepts and refitting measures to reduce noise at the source. Project duration until end of 2007.	Several refitting measures have been tested successfully on prototypes of the Airbus A320 family and the Boeing MD-11F.	▶▶
	Becoming main project partner in the interdisciplinary research project "Noise-Optimized Approach and Departure Procedures" (LAnAb). Using an advanced simulation program from DLR, the assessment of flight procedures with regard to noise development is set to improve significantly. Project has been extended to mid-2007.	By carrying out noise measuring flights, Lufthansa contributed decisively to creating (A319: 2001) and expanding (A319: 2004) a database on aircraft noise sources, which is necessary to run the simulation program. Initial results of analyses carried out by partner DLR were checked against further measuring flights in October 2006. Data analysis continues.	▶▶
	Participating in EU research project ERAT (Environmentally Responsible Air Transport).	Project launch planned for mid-2007.	!

**Intermodal transport**

Key environmental goals	Environmental measures	Degree of attainment	Status
<b>Create intelligent mobility concepts in cooperation with railway operators in order to shift short-haul traffic to the rails.</b>	Introducing AIRail connections on selected short-haul routes.	In March 2001, AIRail connections between Frankfurt Airport and Stuttgart Central Station were launched (currently 13x daily). In May 2003, the route Frankfurt Airport–Cologne Central Station was added (currently 26x daily). Thus, two of six flights between Frankfurt and Cologne could be withdrawn.	✓
	Reworking the AIRail concept to optimize the existing product.	Planned for 2007/2008.	!
	Intensifying the cooperation with Deutsche Bahn by offering a more attractive "Rail&Fly" product.	Planned for mid-2007.	!
<b>Create intelligent mobility concepts in cooperation with Fraport.</b>	Supporting an IT-based exchange of dynamic car pools via mobile phone.	In January 2006, a working version of the software became available. At the end of 2006, an application for public assistance was made; a decision is expected in 2007.	▶▶
<b>Expand the combined rail-and-road transport at Lufthansa Cargo.</b>	Adding further routes.	Since January 2003, Lufthansa Cargo has used 50-55 scheduled rail services a week (including ad-hoc capacities) between Freiburg (southern Germany) and Novara (Italy) and between Wörgl (Austria) and Trento (Italy). This helps avoid about 750,000 truck kilometers a year. From April 2007, route planning is to be transferred largely to external partners in the logistics industry. They are contractually bound to evaluate environmentally compatible transport options.	✓

**Environmental management/Communications/Training/Suppliers and contractual partners**

Key environmental goals	Environmental measures	Degree of attainment	Status
<b>Improve internal and external sustainability communications.</b>	Reporting environmental and social issues in Lufthansa's Annual Report, organizing regular internal road shows on environmental and social issues within the Group. Expanding our Internet presence. In 2007, environmental communications are to be expanded to further internal and external media.	Issues related to sustainability have been included in the Lufthansa Annual Report since 2004 (in the Annual Report 2005, the subject of sustainability was covered in the Situation Report for the first time). The Internet presence was completely updated, restructured and significantly expanded in 2006.	▶▶
<b>Expand and optimize the Group-wide environmental database.</b>	Integrating further environmental data; developing a module to automatically import performance and consumption data from Route and Network Profitability for the Lufthansa Passenger Division.	Environmental database was introduced in 2003. Transfer to SAP base took place in 2005. In 2006, Group-wide use for the first time.	▶▶
<b>Expand the offerings of detailed environmental information for employees and integrate environmental subjects into existing communications concepts.</b>	Integrating issues related to the environment into existing training concepts (ongoing).	Environmental subjects are an integral part of basic training for flight attendants, basic courses for pilots, as well as training and continuing education programs for technical employees. In the context of the internal continuing education offerings "Further with education," a lecture on environmental topics is offered regularly.	▶▶
<b>Influence suppliers and contractual partners.</b>	Informing suppliers and contractual partners about Lufthansa's environmental standards.	Ongoing process.	▶▶
	Demanding high standards of environmental efficiency when acquiring new aircraft, engines and equipment.	Are continuously applied in the purchase of new aircraft, engines and equipment.	▶▶

## Energy and resource management/Alternative energy sources

Key environmental goals	Environmental measures	Degree of attainment	Status
<b>Improve the Group-wide energy management.</b>	Installing a new, software-supported capture and analysis system for energy consumption data. This allows timely and accurate localization of performance and consumption peaks. Continuous data capture enables structured purchase of electricity.	Introduction of this tool was started in 2006 at the Lufthansa Base.	▶▶
<b>Take aspects of energy and resource conservation into account when planning, constructing and modernizing buildings of Deutsche Lufthansa AG.</b>	Constructing the Lufthansa Aviation Center as a "low energy building" by using a system of thermoactive construction components, highly insulating elements for the facade, a heat recycling system and other measures. As a result, the new building will require only up to one-third of the energy a comparable conventional building would consume.	The new administration building was occupied in July 2006. Data concerning the building's actual conservation values are expected in 2008.	▶▶
	Setting high utilization and environmental standards for the renovation and redesign of the Lufthansa Training Center in Seeheim. The feasibility of integrating a photovoltaic installation into the building and installing a solar thermal energy collection system on the roof has been evaluated from a planning perspective. The use of a geothermal energy system to generate heat has been assessed. Materials primarily from regional production are to be used whenever possible.	Drilling for the geothermal energy system was carried out in April 2007. Integrating a photovoltaic system and installing a thermal solar energy collection system on the building's roof were not considered feasible and will not be realized.	▶▶
	Taking into account newest-generation heat and energy technology in planning and constructing a new Catering building. Measures being assessed include the use of a rainwater seeping system, roof planting, preconditioning of air and a heat recovery system. In addition, installing closed ramp doors and using district heating are to help achieve substantial energy savings.	Construction began in summer 2006. Heat recovery is expected to yield energy savings of 30 percent. By using natural gas to heat the dishwashers, additional energy savings can be realized. The new construction is expected to help avoid about 5,000 tons of CO <sub>2</sub> per year.	✓
	Reducing non-production-related energy consumption at Lufthansa Technik by 12 percent by the end of 2007.	Project EnergyCheck@LHT will be continued in 2007.	▶▶
	Carrying out a comprehensive study to pinpoint energy savings potentials in the area of maintenance at Lufthansa Technik.	Planned for 2007.	!
<b>Reduce CO<sub>2</sub> emissions from heat supply to buildings.</b>	Modernizing the heat generating systems at the heating plant on Lufthansa Technik's base in Hamburg. Cutting natural gas consumption by about 720 megawatt hours per year.	Implementation planned for 2007.	!
<b>Reduce emissions of solvents.</b>	Acquiring and installing a catalytic afterburner system for the used-air duct of the isopropanol cleaning facility of the hydraulics equipment shop.		!
<b>Reduce the specific energy consumption per meal at LSG's European and African locations to 1.45 kWh on average by 2010.</b>	Increasing utilization of catering operations. Monitoring in detail the energy consumption at the individual locations.	In 2006, the average specific energy consumption per meal was 1.4 kWh.	▶▶
<b>Reduce the specific water consumption per meal at LSG's European and African locations to 6.8 liters on average by the end of 2010.</b>	Increasing utilization of catering operations. Introducing newly-developed, high-efficiency dishwashing machines successively at European locations. Monitoring in detail the water consumption at individual locations.	In 2006, average specific water consumption per meal was 8.3 liters.	▶▶
<b>Reduce consumption of freshwater.</b>	Increasing the share of aircraft cleaned with a dry process.	The number of dry aircraft cleanings more than doubled: In 2006, 214 (2005: 103) were cleaned with this water-saving process. A total of more than 500 m <sup>3</sup> of water was thus conserved.	✓
<b>Reduce average weather-related consumption of deicing fluid by 10 percent below 2002/2003 levels by 2007.</b>	Using a Lufthansa-developed monitoring system (HUSKY) to reduce the consumption of deicing fluid.	During winter 2006/2007, the average consumption of deicing fluid fell by 10 percent below the year before. Thus, the consumption of deicing fluid in winter 2006/2007 was reduced on average by 17 percent below winter 2002/2003, and the set goal was reached ahead of schedule.	✓
<b>New goal for 2008: Reduce weather-related consumption of deicing fluid by 12 percent below 2002/2003 levels.</b>			!
<b>Make consistent use of paper-free means of communications.</b>	Installing a suitable IT infrastructure as an alternative for paper archiving; adhering to and monitoring processes.	Step-by-step digitalization of documents and files. Digitalization of documents has led to a reduction in paper consumption of 20% in some areas. The digitalization of paper documents will be intensified.	▶▶
	Reducing the use of thermo-paper by switching from paper tickets to electronic tickets (so-called etix) step-by-step.	From April 2007, Lufthansa tickets for purely intra-German flights are to be issued only electronically. Additionally, Lufthansa supports the goal of the international aviation organization IATA to increasingly issue electronic tickets instead of paper tickets worldwide.	!
<b>Reduce the use of paper made from fresh fibers.</b>	Converting Lufthansa's internal and external media as well as all printing and photocopying for internal use from fresh-fiber paper to recycling paper.	Conversion of additional internal media has been accomplished. Lufthansa CityLine has already changed all paper used for internal copying and printing to recycling paper. The Lufthansa Sustainability Report <i>Balance</i> has been printed on 100% recycling paper since 2005.	▶▶

## Research at Lufthansa

### Securing the future

Air transport affects the environment. To be able to assess these effects objectively, target-oriented research is needed. Lufthansa supports a broad range of scientific projects, whose results form the basis for the Group's effective environmental care.

#### EU network AERONET

##### Network for the coordination of European research projects on aviation issues

The network AERONET gathers together all important players in European aviation: aircraft manufacturers, airlines, airport operators, research institutions, universities, public authorities and political representatives. The project's goal is to facilitate the exchange of experience and knowledge and to smooth the way for the competitive and environmentally compatible development of Europe's aerospace industry.

AERONET is particularly committed to advancing aircraft and engine technology with regard to possibilities of reducing CO<sub>2</sub> and other emissions of pollutants across the entire air transport system. This approach comprises aircraft, flight routings and airport operations alike. Taking into account the debate on the international level, the network searches for specific measures that can help reduce emissions of CO<sub>2</sub> and other pollutants from air transport. Here, AERONET sees itself as a link between atmospheric research and aviation technology research.

In its role as a platform for the exchange of experience and information, AERONET helps significantly to advance Europe's position in international competition. For example, it gives engine manufacturers more immediate access to the latest research results concerning the effects of air transport on the atmosphere. In addition, AERONET supports the European Commission in identifying relevant issues for its framework of research programs and supports the initiative toward joint projects.

→ [www.aero-net.org](http://www.aero-net.org)

#### EU research project MOZAIC

##### Atmospheric research on long-haul flights

The research project MOZAIC (Measurement of ozone, water vapour, carbon monoxide and nitrogen oxides aboard Airbus in-service aircraft) was established in 1993 by European scientists, aircraft manufacturers and airlines. Its goal is to obtain a far-reaching understanding of the processes in the atmosphere and to research the effects of human activities on the atmosphere's composition. The researchers' interest focuses on effects related to ozone and water vapour at altitudes between 9 and 12 kilometers. To acquire a broad data base, which then serves as the point of departure for studies concerning the chemical and physical processes in the atmosphere, data has been captured on about 2,300 flights every year since 1994. In 2006, four Airbus A340-300 long-haul aircraft were en route every day for this project – including two operated by Lufthansa. These aircraft are equipped with sensitive sensors, which continuously measure the air's content of ozone, water vapour, carbon monoxide and nitrogen oxides while the aircraft is in flight. This data, which will continue to be collected until the end of 2007, helps to make climate models more accurate. Since the termination of EU research funds in 2004, the airlines and research institutes participating in MOZAIC have continued these measurements at their own expense.

→ [www.fz-juelich.de](http://www.fz-juelich.de)



En route every day: For the last 13 years, the MOZAIC sensors have routinely supplied data for climate research.



Commitment to climate research: The inlet system under the fuselage of the Lufthansa Airbus A340-600 "Leverkusen" collects climate data on long-haul flights at an altitude of 12,000 meters.



### EU research program CARIBIC

#### Atmospheric measurement laboratory aboard the "Leverkusen"

Like MOZAIC, the European project CARIBIC (Civil Aircraft for the Regular Investigation of the Atmosphere Based on an Instrument Container) serves basic research on the atmosphere. Since December 2004, a container filled with scientific instruments weighing 1.6 tons has been regularly loaded into the cargo hold of the Lufthansa Airbus A340-600 "Leverkusen." During these flights, 20 scientific instruments installed in the container measure numerous trace gases as well as the concentration and distribution of aerosols. For this purpose, ambient air is fed to the container by means of a dedicated air inlet system on the aircraft's fuselage. There, the air is analyzed online. In addition, 28 air samples are stored for later analysis in a laboratory. The schedule for 2006 comprised 40 flights. Emphasis was placed on the route Frankfurt–Canton–Manila to investigate the effects of air pollution in the Asian region. Often, the "Leverkusen" crossed large-scale "pollution trails," whose chemical signatures usually indicated polluted air from areas close to the ground that had been transported upward by convection. In addition, the long-distance transport of air masses polluted by emissions from burning biomass in Southeast Asia was observed.

→ [www.caribic-atmospheric.com](http://www.caribic-atmospheric.com)

### EU research project IAGOS

#### Development of an infrastructure to observe the Earth's atmosphere on a global scale with support from civil aviation

IAGOS (Integration of routine Aircraft measurements into a Global Observing System) is a further development of the MOZAIC project. A total of ten partners from the research sector and the aviation industry participate in it. Launched in April 2005, IAGOS is to make a substantial contribution to the creation of an atmosphere-monitoring network by 2008. The goal is to set up a measuring infrastructure that allows civil aircraft in flight (in situ) to routinely record data on trace gases, aerosols and clouds – worldwide and on a broad basis. At the center of these research efforts are lightweight, low-maintenance instruments, which can be integrated into an airline's operations in an efficient manner. These newly developed instruments are to be tested initially aboard Lufthansa aircraft. The data IAGOS is set to generate will be of central importance for climate research and the numerical weather report.

→ [www.fz-juelich.de/icg/icg-ii/iagos](http://www.fz-juelich.de/icg/icg-ii/iagos)

### EU research project TBCplus

#### Development of highly resistant ceramic coatings for engine combustion chambers

Lufthansa Technik, in cooperation with renowned European aviation institutions, has developed an innovative ceramic protective coating for the combustion chambers and turbine fan blades of aircraft engines. It remains stable under extremely high temperatures and thus protects these components better against overheating. With the thermal barrier coatings (TBCs) currently in use, changes in the surface of these materials have been observed repeatedly, particularly in hot areas. Such changes might decrease heat insulation properties or lead to flaking. The consortium expects that using the new-type TBCs will improve the component life span and performance of the engines in use today. After licensing by the aviation authorities, the material's improved protective properties are to be tested and evaluated in operations for several years. Based on these findings, the new TBCs are expected to influence new engine designs and contribute to increasing efficiency and reducing emissions.

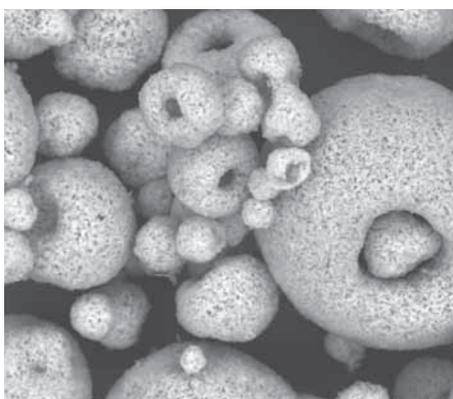


Image generated by a raster electron microscope of the micropowder for the ceramic protective coating of turbine fan blades and combustion chambers, using a plasma spray process.

### Interdisciplinary research network “Quiet Traffic”

#### Joint research projects to lower traffic-related noise emissions

To reduce traffic-related noise emissions, the research network “Quiet Traffic,” initiated by the German Aerospace Center (DLR), counts on interdisciplinary cooperation between industry, research institutions and transport industry. Within the network, three working groups examine the specific issues from the areas of road, rail and aircraft noise. Two other working groups analyze issues concerning all modes of transport, such as noise effects, traffic management, sound propagation and noise optimization.

The program section “Aircraft Noise” is led by the Head of Group Environmental Concepts at Deutsche Lufthansa AG. This working group coordinates the following projects:

- The **joint research project LEXMOS** (Quiet engine nozzle systems and advanced methods for the localization of noise sources) is headed by Rolls-Royce Deutschland. Computer simulations and experimental settings are used to investigate how sound is generated at the edges of engine nozzles.
- In the **joint research project NASGeT** (Innovative active/passive systems for noise reduction on engines), researchers investigate how sound generation can be influenced actively via adjustable engine components. This project is headed by the EADS Corporate Research Center.
- The **joint research project FREQUENZ** (Research on reducing and determining the source noises on civil aircraft by experimental and numeric means) is headed by Lufthansa and consists of three sub-projects flowing one from the other. In this way, new aero-acoustic calculation methods are first developed, then verified in wind-tunnel experiments, and finally used for the development of exemplary retrofit measures to reduce noise at the source. In October 2006, a Lufthansa Airbus A319 was again fitted with prototype measures, such as specific modifications to its engines; subsequently, the noise from the overflying aircraft was measured by a microphone system. As well as Lufthansa and the DLR, the FREQUENZ consortium includes manufacturers and universities.



Wind tunnel trials aimed at determining the noise reduction potential on landing gears.

The project can build on existing work jointly conducted by Lufthansa, aircraft manufacturers, public authorities and the DLR. This includes noise measuring flights with a Boeing MD-11F of Lufthansa Cargo and an Airbus A319 of the Lufthansa Passenger Airline. The goal of these flights was the recording of the aircraft-specific characteristics of noise sources and the formulation of appropriate noise-reduction measures.

- **Joint research project LAnAb** (Noise-optimized approach and departure procedures)  
Using approach procedures such as “low drag/low power” or the Continuous Descent Approach (CDA) can contribute significantly to reducing aircraft noise in the vicinity of airports. Here, advanced simulation methods, which have been further developed in the context of the project and allow the greatest degree of accuracy thus far, are used to analyze the sound generation of aircraft. A second set of fly-over measurements was recorded in June 2004, using an Airbus A319, with the purpose of expanding and improving the database of the simulation tool. A further measurement campaign in October 2006 served to validate the first prognostic results of the simulation tool. To do so, Lufthansa pilots flew different



An acoustic camera allows scientists to pinpoint noise sources on an aircraft within a decimeter. Doing this also requires the accurate recording of the aircraft's position.

approach and departure procedures with an Airbus A319. The noise carpet generated by the aircraft was recorded by microphones in an area measuring 40 kilometers by 5 kilometers.

The interdisciplinary project ended in March 2007. In addition to Lufthansa, the LAnAb consortium includes Deutsche Flugsicherung, the DLR, the EADS Corporate Research Center and others.

All the joint research projects described above receive funding from Germany's Federal Ministry of Economics and Technology in the framework of various programs.

→ [www.fv-leiserverkehr.de](http://www.fv-leiserverkehr.de)

### **EU research program SEFA**

#### **Investigation of possibilities to influence the tonality of aircraft noise**

SEFA (Sound Engineering for Aircraft) is working to develop design criteria for low-noise aircraft as well as the necessary instruments to evaluate these criteria. The project works to identify those "noise signatures" in aircraft noise that are perceived as least annoying. To do so, the researchers evaluate the influence of the sound spectrum and the direction in which noise is emitted. Deutsche Lufthansa AG's Head of Group Environmental Concepts serves on a consulting panel of experts, which accompanies and appraises the project's work.

### **Epidemiological study of cosmic radiation**

#### **Continuation of a research project concerning possible mortality risks for cockpit and cabin crews**

As early as 1997, epidemiologists at Bielefeld University investigated whether cosmic radiation has measurable health effects on flying personnel. Together with the German Cancer Research Center and the Professional Association of Vehicle Operators, they analyzed cases of death among all flying personnel who worked for Lufthansa or LTU between 1960 and 1997. The study concluded that there were no indications that work-related increased exposure to cosmic radiation leads to a general significantly increased mortality risk due to diseases associated with radiation. To further increase the validity of this study, the investigation period was extended in a follow-up project to the year 2003. The project's scientific supervision is shared by Bielefeld and Mainz Universities. Initial results are to be presented in 2007.

## Corporate citizenship

# Award miles give wings to aid projects

Now participants in the frequent flyer program Miles & More can donate their award miles for charitable purposes. Following Lufthansa's employees and companies, the airline's customers also make a commitment to the protection of people and the environment with "Miles to Help."

**Making a charitable** donation instead of consuming selfishly – this is the key idea behind a new donation program with which Lufthansa would like to encourage frequent flyers to use their mileage balances for charitable purposes. Spurred on by the success of the on-board collection program "Small Change for Big Help" and specific customer requests, the starting signal for Miles to Help was given on November 1, 2006.

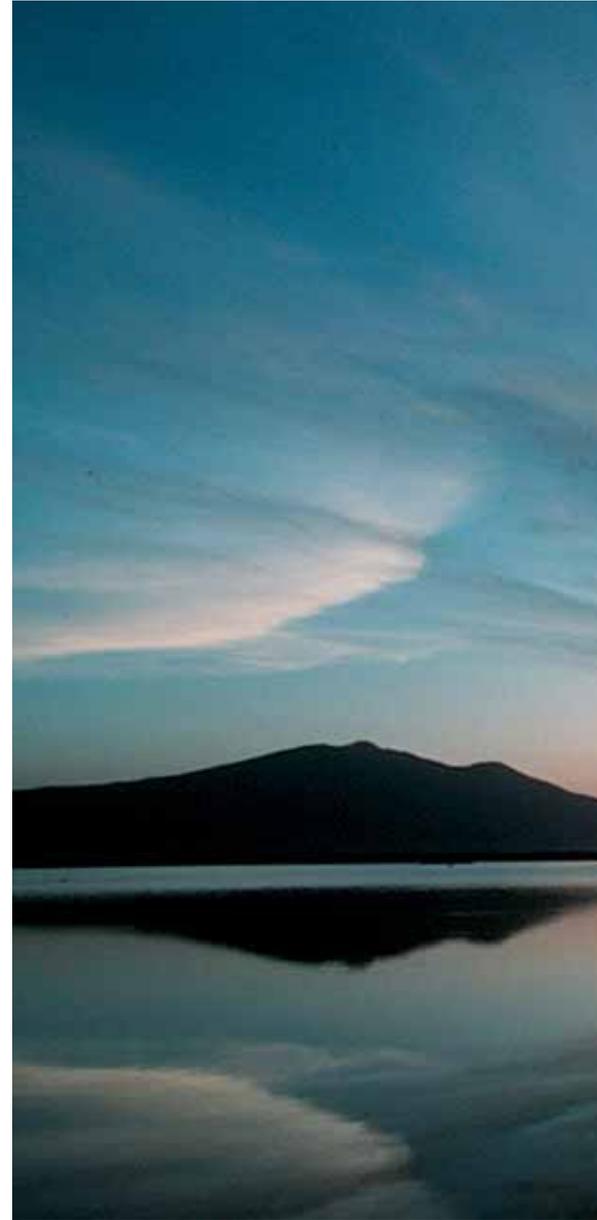
The latest Lufthansa initiative in the area of Corporate Social Responsibility pursues several goals: to win as many people as possible for the protection of nature and persons in need, to collect funds for selected aid projects in an uncomplicated manner, and thus to give even more thrust to projects that have benefited from the company's support for years. Miles to Help is based on a comprehensive concept that enlists the Group's customers in its social and ecological commitment. For it is not only the

airlines – but also their passengers – who bear the responsibility for air transport's unavoidable environmental burdens.

"With Miles to Help, we are responding to the wish of many Miles & More participants to donate their award miles to a worthy cause and thus make an effective contribution to the common good," explains Ulrich Hauschild, Vice President Customer Loyalty and Head of Miles & More.

"Lufthansa stands for a responsible corporate policy, where nature and the environment have their importance and their place."

Lutz Laemmerhold, Director Public Relations





#### Miles & More

Miles & More is the frequent flyer program of Lufthansa, Adria Airways, Air Dolomiti, Air One, Croatia Airlines, the Austrian Airlines Group, LOT Polish Airlines and SWISS. With more than 13 million participants, it is Europe's largest frequent flyer program. Miles & More participants receive award miles for each flight with Lufthansa or one of its partner airlines. Participants collect miles not only for flights, but also when they rent a car from a Miles & More partner, stay at a partner hotel, pay with a Miles & More credit card, or use the product and service offerings from a large range of partners in different lines of business. They can redeem the miles they have collected for many attractive awards, including flight awards to more than 1,000 destinations as well as upgrade, travel or merchandise awards. And since November 2006, Miles & More participants also have the option of donating their award miles to help organizations.

→ [www.miles-and-more.com](http://www.miles-and-more.com)

#### Customers can select one of three aid organizations

With Miles to Help, it is the Miles & More participants themselves who decide which aid organization is to benefit from the equivalent value of their award miles. There are three highly respected organizations to choose from, including the HelpAlliance, which was founded by Lufthansa employees, and the international lake network Living Lakes. The Group has aided both organizations with staff, funds and logistical support for many years. Number three in the round – and also supported by Lufthansa since the launch of Miles to Help – is the aid organization SOS Children's Village, which had been a partner of the former SWISS Travel Club for many years. The frequent flyer program operated by SWISS was entirely assimilated into Miles & More on April 1, 2006, following the integration of the Swiss carrier into the Lufthansa Group. "We're very pleased that now we can continue this successful partnership with Miles to Help," confirms Ulrich Hauschild.



### Doing good with miles: HelpAlliance

The HelpAlliance was founded in 1999 by socially-committed Lufthansa employees. They work as volunteers and accompany with great personal commitment nearly 20 aid projects worldwide, working together with local partners. These include business start-ups, street-kid projects, training facilities, orphanages and bush hospitals. The goal of this charitable association is to finance schooling for children in the "Third World," to fight diseases and to secure sufficient food supplies. In addition, the HelpAlliance regularly gives support for reconstruction projects – such as following the tsunami in Southeast Asia, the flood catastrophe in Dresden or the earthquakes in India, Iran and Pakistan.

"Those of us who have seen so much misery simply have to take action. Even if that means bidding farewell to the wish to try to solve all the problems of this world in a single day," is how Rita Diop, Chairwoman of the HelpAlliance since May 2006, summarizes her motivation and that of her fellow volunteer supporters.

As children, women and sick persons are often particularly disadvantaged in developing nations, they have a special need for support from aid organizations. Every award mile donated to the association by Miles & More participants directly benefits someone in need. For example, as few as 10,000 donated miles are enough to pay for a year's schooling for a child in India.

Yet the HelpAlliance supports more than just educational projects. The need for help in other social areas is equally enormous. Thus, award miles are also used to relieve the effects of illness, poor hygiene and malnutrition in Africa. "The money reaching us from Miles to Help is a heaven-sent gift. It allows us to better secure the aid projects as well as a number of support projects run by the HelpAlliance with a more solid financial basis," says Rita Diop.

### Doing good with miles: Living Lakes

The work of Living Lakes focuses not on children, but on lakes, including their fauna and flora. The international lake network was founded in 1998 by the international environmental foundation Global Nature Fund (GNF). Lufthansa has assisted it ever since with contributions in kind as well as support for nature conservation projects run by the lake partners directly on location. "Lufthansa stands for a responsible corporate policy, where nature and the environment have their importance and their place. With our commitment, we would like to contribute to the conservation of lakes, wetlands and the areas surrounding them around the

#### Heaven-sent gifts – with real effects

##### HelpAlliance

- As few as 20,000 miles cover the monthly salary of a teacher in East Africa.
- 40,000 miles are enough to provide textbooks and course materials for 20 preschool children in South Africa taking their first steps in formal education.
- 10,000 donated miles are sufficient to pay the school fees for one child in India for a whole year.
- For 10,000 miles, 50 children can be vaccinated once against the most important infectious diseases.
- In India it takes just 20,000 miles to provide a warm meal for 250 children.
- By providing regular meals for orphans and poor children in Ethiopia, the HelpAlliance ensures that these kids develop healthily. There, 40,000 award miles ensure that one child can be nourished healthily for three months.

##### Living Lakes

- As few as 10,000 award miles are enough to purchase a plot of 2,500 square meters in the Pantanal – the Earth's largest wetland – and protect it from destruction.
- It takes only 10,000 award miles to ring and then observe a Siberian crane in China. The resulting insights play an important part in the protection of these large birds.
- In South Africa Miles to Help supports the organization "Trees for Life." The equivalent of 10,000 award miles is needed to purchase, plant and cultivate five fruit trees long-term. In this way, people in underdeveloped regions can gain a low-cost food source that renews itself and is thus easy on the environment.

##### SOS Children's Village

- In Africa 20,000 miles allow a young person to attend a higher-level school or a professional training center for two months.
- In Asia award miles can do a lot of good as well: As few as 40,000 miles ensure the education, medical care and housing of one orphaned child for one month.
- 10,000 miles ensure that one child in South America can stay with his or her biological family for one month with support from the family assistance programs of the SOS social centers.

"With Miles to Help we are responding to the wish of many Miles & More participants to donate their award miles to a worthy cause."

Ulrich Hauschild, Vice President Customer Loyalty  
and Head of Miles & More



world, because they are not only important sources of drinking water but also irreplaceable habitats for many animal and plant species threatened by extinction," explains Lutz Laemmerhold, Director Public Relations.

The Living Lakes network already comprises 45 lakes and wetlands, such as Lake Titicaca high up in the Andes and Lake Victoria in Eastern Africa. Lake Constance in Germany and the Pantanal in the heart of South America are also included. In 2005, Living Lakes was designated as an official Decade Project in the framework of the "United Nations Decade of Education for Sustainable Development."

Just how urgently donations of miles from Lufthansa frequent flyers are needed is illustrated by the example of the Pantanal. The GNF called attention to the threat of destruction of this Brazilian inland marshland as recently as February 2007. It also declared this region of 140,000 square kilometers the "Threatened Lake of the Year 2007" to mark the occasion of the World Day of Marshlands.

The background for this highly publicized "warning shot" is the exploding production of soy beans and sugarcane in the catchment area of the Pantanal. This is a direct result of the worldwide increases in demand for biofuels. Environmental conservationists now fear that untreated wastewater might deliver the deathblow to the complex river system with its 1,700 plant, 665 bird, 265 fish and 123 mammal species.

"At the Pantanal it is now almost too late. This Garden of Eden might completely disappear by 2050," says Udo Gattenlöhner, Executive Director of the Global Nature Fund, about the seriousness of the situation. "Therefore, each donated mile is also active protection of the Pantanal." As few as 10,000 award miles are enough to buy up 2,500 square meters of this paradise and save it from destruction.

However, Living Lakes depends on the willingness of Lufthansa customers to donate miles for many other environmental projects as well. The lake network of the Global Nature Fund works on all continents to protect rare animal and plant species, reforest fire-cleared rain forests, restore wetlands and preserve life-giving drinking water reserves for future generations.

The crane – the bird in Lufthansa's corporate logo – also receives the attention of this global environmental initiative. In China, for example, Living Lakes is committed to helping protect the Siberian crane (*Grus leucogeranus*), which counts among threatened species. It takes only 10,000 award miles to ring one of these majestic large birds. Marking individuals provides important insights on the animals' migration paths, wintering areas, spread, fidelity among pairs, breeding and territorial behaviors, as well as life expectancy.

#### Doing good with miles: SOS Children's Village

SOS Children's Village is a non-governmental development aid organization that has been championing the rights, needs and concerns of children and youth since 1949. The association's work concentrates on children and adolescents who are abandoned, unprovided for and unaccompanied as well as on disadvantaged families. Today, SOS children's villages and youth facilities provide a home for more than 60,000 children and adolescents in 132 countries and territories on all continents. Beyond that, hundreds of thousands benefit from educational, social and medical programs and aid campaigns.

And the needs are enormous. That parents give away their children because they are unable to feed them by their own efforts, for example, is unimaginable in affluent industrialized countries. But in many underdeveloped countries in Africa and South America, this is a sad reality. And yet just 10,000 award miles can prevent a family from being parted forever. That is how many miles the family support programs of the SOS social centers need to spare these parents and their children a traumatic separation.

#### The HelpAlliance's on-board collection program "Small Change for Big Help"

Since May 2001 Lufthansa customers have had the opportunity to support social causes by participating in the on-board collection program "Small Change for Big Help." Unlike with Miles to Help, passengers donate not award miles, but foreign-currency coins and bank notes they are still carrying on their long-haul return flights. In this way, Lufthansa collected 279,575 euros for charitable purposes in 2006 alone.

#### Development of donations:

→ 2001:	207,175 €
→ 2002:	232,692 €
→ 2003:	216,539 €
→ 2004:	238,023 €
→ 2005:	294,870 €
→ 2006:	279,575 €

Start of Condor's participation: October 2003

#### Overwhelming interim results

Two months after the launch of Miles to Help, one thing was already certain: The frequent flyers among Lufthansa's customers are following up their desire to help with measurable action. Despite the fact that the airline, as a commercial enterprise, is not allowed to issue receipts for charitable donations. Nevertheless, in the two months to year-end 2006 Miles & More participants donated 18 million award miles for charitable purposes. And just two months later, these donations had already climbed to 25 million miles.

"We're extremely satisfied with the success of Miles to Help in the first months of its existence," says Miles & More head Ulrich Hauschild. "Not only does the offer meet our customers' approval, but the media have also taken up the subject numerous times and always with a positive evaluation."

To further increase this positive resonance, Miles & More is vigorously promoting the new donation program – with ads in the *Lufthansa magazine*, in the Miles & More newsletter and on the frequent flyer program's website. In addition, a brochure has been produced that is on display aboard aircraft to inform customers in depth about Miles to Help. The goal of Miles & More for 2007: to promote mile donations with captivating special campaigns all year round.

#### Special support for four projects

The project-related evaluation of donations shows that four Miles-to-Help projects have been attributed miles especially generously. Firstly, the volunteers of HelpAlliance have already been able to have more than 12,000 children in India vaccinated against infectious diseases – the kind of medical care that is matter of fact for children of their age in Germany. Secondly, the generous donations of miles allowed the association to relieve 275 children of their worries about school fees, for this year at least, and to give them a fair chance at education and later participation in society. Thirdly, Living Lakes has received hands-on support for its fight to preserve the Pantanal in Brazil. Thanks to award mile donations, the lake network has been able to buy 54 hectares of marshland and thus protect it from destruction. That is a surface large enough to accommodate 92 Airbus A380 wide-body jets or 60 soccer playing fields. Fourthly, SOS Children's Village has also gained more financial elbowroom. Thanks to Miles to Help, the





children's aid organization has been able to push forward its Latin American family support program even more vigorously since November.

#### **Donating miles is child's play**

Lufthansa customers who would like to translate their charitable intentions into hard cash can do so conveniently on the Internet. On its website [www.miles-and-more.com/milestohelp](http://www.miles-and-more.com/milestohelp) Lufthansa informs about the different Miles to Help projects. This information is also available in all print publications of Miles & More. Once customers have made their choices, they can easily donate award miles by means of an online form. They can also contact the Miles & More team by telephone. The service representatives make sure that donations get to their recipients in the most direct way. Or finally, customers may download a fax form from the website.

#### **Help needs to be dependable and continuous**

With Miles to Help, Lufthansa demonstrates once again that it is a strong partner for organizations that invest their time and energy in protecting people and the environment – above all in world regions where droughts, floods, earthquakes or military conflicts cause particular plights. For Lufthansa, as a Group with worldwide activities, the highest priority will continue to be to preserve the Earth's resources for future generations and to help shape globalization in socially and ecologically responsible ways. One thing is certain today: Miles to Help will not be the last initiative of this kind that the airline thinks up and then fills with life. Beyond Miles to Help, Lufthansa has been committed to a number of social and ecological projects around the world for many years (see section "Corporate citizenship" from → page 82).

## Corporate citizenship

## Responsibility in a globalized world

A decisive element of Lufthansa's corporate culture is its commitment to ecological, social and ethical goals.

At the root of this approach lies the conviction that global challenges such as environmental protection, education and understanding among nations can only be tackled at the international level. As a Group with worldwide activities, Lufthansa has supported aid projects in Germany and abroad for many years. Lufthansa's commitment to sustainable development also serves to underpin its trusting and open dialogue with the company's stakeholders.

## Culture

### Virtuoso border crossers: Lufthansa Festival of Baroque Music

Borders are there to be crossed. The renowned Lufthansa Festival of Baroque Music took up this challenge in 2006 – and mastered it with aplomb. For the first time in the 23-year history of this baroque highlight, the sounds of Bach, Händel, Telemann and Vivaldi could be heard in perfect harmony with modern rhythms from Africa, Eastern Europe, Turkey and the USA. With La Stagione from Frankfurt and the Freiburger Barockorchester, the public was treated to two leading German orchestras offering period-instrumental performance. Moreover, the Jacques Loussier Trio impressed listeners in a sold-out auditorium with its extraordinary jazz interpretations of works by Bach.

This early-summer cultural event has taken place in an authentic setting since 1998 – the baroque church of St. John's Smith Square, a masterpiece of English baroque architecture. In 2006, London's famous Westminster Abbey also hosted one of the festival's 15 or so concerts. Lufthansa has been a sponsor of this musical highlight for more than 20 years. In the British market, strategically an important one, the Group uses this event not only to place some important cultural accents but also to take care of its most faithful customers.

Thanks to first-rate soloists and ensembles as well as exquisite programming, the Lufthansa Festival of Baroque Music has gained worldwide renown. This year, aficionados of baroque music may embark on a musical voyage to Spain and Latin America. From 2008, Lindsay Kemp, Senior Producer at the BBC, will be responsible for the festival's artistic direction.

→ [www.lufthansafestival.org.uk](http://www.lufthansafestival.org.uk)

### European diversity: "Fairy Tales before Take off"

Passengers, visitors and employees were able to experience a truly "fairy-tale kind of day" on August 14, 2006 at Frankfurt Airport. The reason: Nine well-known storytellers from eight European countries turned different airport areas, including Terminal 1's Departure Hall A, into a stage in order to cross borders between languages, countries and cultures with legends and fairy tales from across Europe. Lufthansa realized "Fairy Tales before Take off" at Frankfurt Airport in cooperation with the Goethe Institutes in Frankfurt and Brussels. The event originated from an initiative of the Association of European National Cultural Institutes and is supported both by the European Commission and partners in business.

"Fairy Tales before Take off" aims at showing the beauty and uniqueness of other languages and that foreign languages can be learned in creative and fun ways. The



The Lufthansa Festival of Baroque Music has found its permanent residence in London, Europe's most demanding venue for ancient music. The church of St. John's Smith Square in the borough of Westminster offers the perfect backdrop, both acoustically and visually.



### An overview of the HelpAlliance's tsunami projects:

1. Project Certco (India, southeastern coast, mentoring project Lufthansa Cargo): Construction of a training center for about 140 young people, including training; project to be completed: June 2008.
2. Round Table India (India, east coast, mentoring project Lufthansa Cargo): Reconstruction of five primary schools for about 700 children; project has been concluded successfully.
3. Don Bosco (India, east coast): Replacement of teaching materials for 2,000 children; trauma therapy for more than 7,000 children in 63 coastal villages; project has been concluded successfully.
4. Don Bosco (India, west coast): New construction of 25 houses; in addition, education for more than 300 children and their psychological care; project to be completed: December 2007.
5. Don Bosco (India, west coast): New construction of 35 houses; installation of drinking water supply for 150 fishing families; project to be completed: June 2008.
6. Diocese Kottar (India, southern coast): Two years' of trauma therapy for 1,000 children and young people from 22 villages; project has been concluded successfully.
7. First aid from Flight Captain Thomas Buershaper (India, east coast): Fishing nets and boats for people living in coastal area; meals supplied to fishing families in distress; project has been concluded successfully.
8. School Kalmunai (Sri Lanka, east coast; joint project of SriLankan Cares, HelpAlliance and GTZ; mentoring project Lufthansa Technik): Reconstruction of a primary and secondary school for about 1,600 children; project has been concluded successfully.
9. Private initiative for fishing families (Sri Lanka, west coast; help from Lufthansa Technik employees): Immediate help for fishing families by buying fishing nets and boats; renovation of a school, construction of new houses; project has been concluded successfully.
10. Celss (Sri Lanka, east coast; project suggestion of a Lufthansa Technik employee): Construction of a primary school for about 350 children; project has been concluded successfully.
11. Children's World Academy (Thailand, southwest coast; mentoring project Lufthansa Passenger Airline): Construction of a kindergarten for 30 children; project has been concluded successfully.
12. Amurt (Indonesian, Trienggadeng, mentoring project of Lufthansa Systems): Construction of an orphanage for 60 girls; purchase of computers and sewing machines; project has been concluded successfully.

particularity of this exemplary initiative: Each storyteller illustrates the shared cultural heritage in his or her respective mother tongue – including fairy tales such as “Little Red Riding Hood” or the “Bremen Town Musicians.” German, Danish, Gaelic and Finnish could be heard as well as French, Dutch, Czech and Hungarian. The actors consciously did not use props but instead relied fully on their voices and gestures for their artistic expression. The storytellers also appeared at the airports in Brussels, Prague, Budapest, Helsinki, Copenhagen and Dublin.

## Social projects

### Tsunami aid – the HelpAlliance takes stock

“A future for the children” was the motto for the fund drive that encouraged Lufthansa employees and the Group's Executive Board to donate 1.05 million euros in an unprecedented aid campaign for the victims of the tsunami. Adding interest, these donations grew to 1.07 million euros in 2006. The HelpAlliance has initiated, coordinated and accompanied 12 projects with these funds since January 2006, particularly in the most affected coastal areas in Thailand, Sri Lanka, India and Indonesia. While certain tsunami projects were concluded in December 2006, others will continue until 2007 and 2008.

The transparent, long-term use of funds has been made possible by the helpers' strong commitment and by means of sound structures. The HelpAlliance also benefited from the fact that individual Lufthansa business segments assumed mentorship for specific projects.

### Helping where help is needed

For example, in the context of the Certco project, Lufthansa Cargo will accompany a training program for about 140 young people in India until June 2008. The goal of Certco is to teach these young adults a skilled trade, so that they will be able to earn a living on their own. Knotting fishing nets is just as much part of the training as is repairing outboard engines or building fiberglass boats.

A Lufthansa Systems mentoring project also provides help for self-help. In this spirit, a new orphanage for girls was built in the Indonesian village of Trienggadeng and inaugurated on December 8, 2006 as a home for 60 children. These funds were also used to buy sewing machines, so that the girls can one day become self-sufficient by selling the clothes they sew themselves. Additionally, Lufthansa Systems provides computers and the necessary technical support.

A therapy project on India's southern coast illustrates that the HelpAlliance also looks after the psychological, physical, and psycho-social effects of the flood disaster. Here, the HelpAlliance made it possible for 1,000 youths from 22 villages in the diocese of Kottar to be treated in trauma therapy.

### New on-board video on the HelpAlliance

In order to inform as wide a public as possible about the commitment of the employee organization, Lufthansa has been showing a new video on the HelpAlliance on all long-haul flights since February 1, 2007. The four-minute film not only informs about the many help projects around the world, but also draws attention to a donations envelope in the seat pocket. The video is available in six languages and features the song “For the Children of the World” as a musical background.

For further information about the HelpAlliance's work visit:  
→ [www.help-alliance.com](http://www.help-alliance.com)



Beaming faces at Day Nursery 47 in Frankfurt: 90 three-to-six-year-olds were delighted by the presents they received thanks to the Christmas tree campaign of the "Junior Round Table."

### **"Junior Round Table" – Junior employees assume responsibility**

Commitment to social causes is not a question of age at Lufthansa. The best example: the "Junior Round Table" (JRT). This network for junior staff offers young Lufthansa employees a chance to work for the common good outside the workplace. In 2006, 543 members at the locations Frankfurt, Hamburg, Cologne and Munich took advantage of this opportunity by participating in the five teams Management, Lectures, Culture, Communication and Social Involvement. Social Involvement, for example, aims to support children and young people in Frankfurt and Hamburg with specific campaigns. Not only did the Lufthansa juniors make it possible for kids to visit a zoo, but they also organized a soccer tournament, a school lesson entitled "Why does an aircraft fly?" and job application training for students at secondary schools. The pre-Christmas sale of home-baked cookies and waffles also brought in some welcome gift-giving cash: The proceeds of 1,000 euros were donated to the organization Special Olympics Hamburg and helped to buy new sports equipment for children. In Frankfurt, a shirt worn and signed by soccer player Bastian Schweinsteiger was raffled off, which meant that the tidy sum of 500 euros could be donated to the project "Music in the greenhouse: Children play for children," an initiative of the Child Protection Alliance Frankfurt. Another big success was the make-up station that the Junior Round Table organized for the World Children's Day summer party organized by the Child Protection Alliance Frankfurt, as was the action day at Freudenberg Castle with kids from the children's home in Rödelheim. The highlight of the JRT's 2006 activities was its Christmas tree campaign in Frankfurt: Thanks to this initiative, 90 three-to-six year-old preschool children at Day Nursery 47 received a personal Christmas gift and vouchers for excursions, theater performances and swimming pool visits for the entire class. These presents had a cash value of 3,400 euros. Members of the Junior Round Table regularly benefit from lectures, guided visits, social gatherings and cultural events.

## Education

### **Clever kids: "Lufthansa Experience Knowledge"**

How do you load a freight container in a professional way? What is a purser? And how do you clean an aircraft? These and other captivating questions from the world of aviation were the subjects pursued by children from fifth and sixth classes in schools in Hesse at the very first "Knowledge and Experience Days" at Lufthansa. In cooperation with Hesse's Ministry of Education and Cultural Affairs, Lufthansa offered this extracurricular learning opportunity for the first time from November 22 to 29, 2006 as part of its initiative "Lufthansa Experience Knowledge." The expressed goal of this innovative educational offering is to introduce selected school classes to working and professional worlds at Germany's largest airline, get them interested in aviation and thus give them an initial orientation for a professional career. Training and continuing education have great importance at Lufthansa: The Group teaches courses leading to 40 different professional qualifications.

### **Four school classes hit the jackpot**

To ensure that the young people have the opportunity to get acquainted with as many professional areas as possible, four Group companies participated in the "Knowledge and Experience Days": LSG Sky Chefs, Lufthansa Cargo, Lufthansa Flight Training and Lufthansa Technik. However, the large number of candidates – 156 school classes with a total of 4,000 children had applied – meant that lots had to be drawn. Four school classes with a total of 120 pupils between the ages of ten and twelve were the beaming winners. They came from Babenhausen (Offene Schule), Lich (Dietrich-Bonhoeffer-Schule), Frankfurt (Brüder-Grimm-Schule) and Rödermark (Oswald-von-Nell-Breuning-Schule).





But before pupils could participate in the “Knowledge and Experience Days,” they had to pass the two-step selection process the airline had set up alongside the luck of the draw. First, they had to successfully solve a knowledge test, the “Lufthansa Brainteaser.” The purpose of this exercise was to get the children tuned into the Group and its subsidiaries before the event. Then, they had to demonstrate their willingness to act as knowledge reporters and to document their impressions from the “Knowledge and Experience Days.”

After the four winning classes had successfully cleared all hurdles, what awaited them was not dry theory, but hands-on practice. On the airport apron, in a hangar or in the canteen’s large-scale kitchen: For four days, the pupils were actively integrated into the ongoing work processes and thus gained a comprehensive insight into the different professional and working areas at the company. Additionally, six visits to the maintenance facilities at Lufthansa’s home base in Frankfurt were raffled off among all applicant classes.

Given the project’s overwhelming success, “Lufthansa Experience Knowledge” will take off again in 2007.

→ [www.lufthansa.com/erlebnis-wissen](http://www.lufthansa.com/erlebnis-wissen)

#### **“Fascination Flying”: Technology lectures for children**

The atmosphere was one of close concentration at the Hamburg University of Applied Sciences (HAW) from February 21 to March 21, 2006. The reason: the lecture series “Fascination Flying.” Each lecture was attended by about 200 spell-bound boys and girls between the ages of eight and twelve. For six days the young students and their parents learned not only what incredible forces the air holds and why aircraft fly, but also why the parts of an aircraft fit to the millimeter – despite the fact that they come from different manufacturers. The joint educational offering of the HAW and the Qualification Offensive Aviation and Space Industry was supported by Lufthansa Technik and others. Studies on career selection have shown that children develop preferences for certain professions early on. So “Fascination Flying” aims at getting pupils enthusiastic about technical and scientific subjects and attracting their interest to professions in the aviation and space industry.

To help make sure that some of those “junior scientists” might one day become junior employees for Hamburg’s aviation industry, the event went well beyond abstract theory. After each lecture, a supporting program appropriate for the pupils’ ages took place, featuring experiments, exciting insights into the workings of a flight simulator, aircraft model construction and a visit to the scientists of the aviation workshop. On March 28, a “practice day” took place at Lufthansa Technik and other locations. Due to the enormous success encountered by the lecture series last year, the learning and participation adventure “Technology for Children: Fascination Flying” went into the second round in 2007 – again in fully “sold-out” auditoriums.

→ [www.technik-fuer-kinder.de](http://www.technik-fuer-kinder.de)

#### **business@school – Business goes to school**

Since 2002, Lufthansa has supported the initiative business@school, which was launched by the management consultancy The Boston Consulting Group in 1998. The project’s goal is to give 10th-to-13th-year high-school students practice-oriented insights into the everyday workings of small and large companies and to awaken their interest in the subject of business. In addition to business knowledge, the participants also learn key qualifications such as entrepreneurial thinking and teamwork.

business@school projects are divided into three phases. During the first two phases, students become acquainted first with a large corporation and then with a small

company. In the last phase they design their own business idea. During the project, the young people are also supported by employees of the Lufthansa Group. There is enormous interest in business@school: While only two pilot schools participated in the first year, this number has risen to 70 schools in Germany, Austria, Switzerland, Singapore and Italy during the project year 2006/2007. In 2002, the initiative received the award "Freedom and Responsibility" from the umbrella organizations of German industry.

During the past school year, 27 volunteer Lufthansa employees acted as school mentors, showing the young participants over a period of ten months how to develop their capacities of independent thought and action.

→ [www.business-at-school.de](http://www.business-at-school.de)

## Environmental Sponsorship Program

### Living environmental protection – the Nature Summer Camps

Mending pasture fences instead of enjoying wellness spas, counting zebras instead of lying in the sun: In 2006, numerous Lufthansa employees and their children decided in favor of an unusual kind of active holiday. Their destinations were the Nature Summer Camps run by the Global Nature Fund (GNF) in South Africa and Estonia. For two to three weeks, the volunteer helpers had the opportunity to make an active contribution to protecting the environment, cultivated landscapes, unique lakes and rivers, and wetlands. The Nature Summer Camps are an initiative of the international environmental foundation Global Nature Fund, which Lufthansa has supported since 2004 as a project partner. All travel destinations are located within the regions that are part of the international lake network Living Lakes. On location, the Lufthansa employees work closely together with local environmental protection organizations. Depending on the specific project emphasis, their tasks ranged from taking inventories of endangered wildlife populations and carrying out environmental education to landscape conservation, species protection and water pollution control. In 2007, the GNF Nature Summer Camps will again pitch their tents on the banks of the Estonian lakes Võrtsjärv and Peipsi and the South African Lake St. Lucia.

→ [www.globalnature.org](http://www.globalnature.org)

→ [www.livinglakes.org](http://www.livinglakes.org)



### Pilot project "Rainforestation Farming" is bearing fruit

The pilot project "Rainforestation Farming" has changed the lives of quite a few small-scale farmers on the island of Leyte in the Philippines. Instead of cutting down rain forests and replacing them with environmentally damaging monocultures, today many farmers cultivate the land in ways that are close to nature. That this approach is bearing fruit is evidenced by bamboo, rattan, as well as hardwoods and softwoods from environmentally protective agricultural production. Lufthansa has supported this initiative of Euronatur, Hohenheim University and Leyte State University for many years. The goal is to stop fire clearings and uncontrolled logging and to preserve the few remaining rain forests. "Only about 7 percent of 7,000 islands in the Philippines are still covered by primeval rain forests," says Lutz Laemmerhold, Director Public Relations, "while this figure stood at 60 percent just 40 years ago." On Leyte and some neighboring islands, about 30 experimental areas have been reforested. The Philippine forestry authority is also convinced of "Rainforestation Farming" and intends to use this method in the future.



Planting diversified, exploitable forests offers farmers on the Philippine island of Leyte a sustainable way of earning their living.



### “Stripping machine”

In the context of the Abaca project, shrubs of the wild banana species *Musa textilis* are cultivated on some experimental areas. The fibers produced from this plant are used in composite materials for floor coverings in automobiles. To make the laborious task of harvesting the shrubs easier for the small-scale farmers, an easily transportable “stripping machine” was developed in the framework of a public-private partnership project supported by DEG (German Investment and Development Corp.). This machine makes it easy to extract the fibers from the leaves. Today, each farmer in Abaca produces over 100 kilos of fibers per day instead of the 15 to 18 they managed before.

To pass on the knowledge of “Rainforestation Farming,” students from the Philippines regularly receive scholarships. Two of them are currently preparing to graduate with master’s degrees in “Agriculture in the Tropics and Subtropics” from Hohenheim University. In addition, one Filipino doctoral student is researching how to disseminate the method in a focused manner and how it can be implemented successfully.

### A “sizzling” idea

Lufthansa also supports the idea of a vegetable oil cooker to reduce the enormous need for firewood. According to expert estimates, more than 6 million tons of wood or charcoal are burned every year in the Philippines alone, especially for cooking purposes. “Every day, women inhale a quantity of pollutants at open fires as if they had smoked 250 cigarettes,” reports Claus-Peter Hutter, President of Euronatur. For this reason, the environmental foundation accompanies a scientific project concerning the development of high-performance cookers using vegetable oils. This raw material is available in large quantities at favorable prices and offers the option of preparing healthy food in a healthy manner, while helping to conserve biodiversity.

→ [www.euronatur.org](http://www.euronatur.org)

### Wildlife protection on holiday – Lufthansa’s on-board video points the way

Worldwide, about 8,000 species of wild animals and 40,000 species of wild plants are endangered or threatened by extinction. Widespread habitat destruction and the international trade of items such as carved ivory objects, corals, giant mussels, orchids, shark fins or goods made from snake leather are considered the main causes. To spotlight the resulting decline in biodiversity, Lufthansa encourages responsible conduct with regard to nature in the updated version of its on-board video, which will be shown from summer 2007. Entitled “Living Planet – Fascination Nature,” the six-minute film informs air travelers about the background and goals of species protection. Passengers learn what they can do to help conserve today’s holiday regions for tomorrow’s generations. This video will be shown exclusively on long-haul flights. Lufthansa produced it together with the European Nature Heritage Fund Euronatur, Germany’s Federal Ministry for the Environment and Nature Conservation, and the Bonn Convention on the Conservation of Migratory Species (CMS).

### Balkan Green Belt: Habitat for bears, wolves and lynxes

Bears, wolves and lynxes are just three of the many threatened species now finding refuge in the unspoiled natural regions of the "Balkan Green Belt." Lufthansa supports the conservation efforts for this southern segment of "Europe's Green Belt" in the framework of a cross-border project carried out by the environmental foundation Euronatur. The initiative's goal is to preserve the diversity of animal and plant species in these unique habitats. The "Green Belt" runs across Europe along the line of the former "Iron Curtain." Albania's, Macedonia's and Bulgaria's heavily guarded border

#### Crane protection at Lufthansa – A matter close to our hearts

Due to advancing destruction of breeding, resting and gathering areas, at least 11 of the world's 15 crane species are threatened in their existence. Lufthansa's Environmental Sponsorship Program has been working for the protection of the airline's heraldic bird for more than 30 years. As these "cosmopolitans of the skies" do not stop at national borders, efforts for their protection also have to be organized on an international level. Therefore, Lufthansa supports not only national crane protection projects, but also numerous international nature and species conservation organizations, as the following examples illustrate.



#### Crane Protection Germany

In 1991, Naturschutzbund Deutschland (NABU), the environmental foundation WWF Deutschland and Lufthansa jointly founded the working group "Crane Protection Germany." Ever since, it has been active not only in the conservation of breeding, resting and gathering areas of the Eurasian crane in Germany, but also in international crane protection. In this context, support also goes to the working group's Crane Information Center in Groß Mohrdorf in the Rügen-Bock Region of Mecklenburg-Western Pomerania. This region is the most important resting area for cranes in central Europe.

The latest research project of Crane Protection Germany – monitoring Eurasian, Crowned and Demoiselle cranes in Ethiopia – is supported by Lufthansa. The goal of this project is to investigate the behavior, habits and wintering areas of these cranes in the context of the study "First survey of Eurasian Cranes *Grus grus* in Ethiopia," with a special focus on the Eurasian crane, which winters in this part of northeastern Africa.

→ [www.kraniche.de](http://www.kraniche.de)



#### European Nature Heritage Fund – Euronatur

Lufthansa also supports conservation projects run by Euronatur in Spain and Israel. In northern Israel's Hula Valley, for example, the foundation assists the work of ornithologists, farmers, nature conservationists and regional administrations to help secure the habitat of millions of migratory birds.

→ [www.euronatur.org](http://www.euronatur.org)



#### Society for the Protection of Nature in Israel (SPNI)

In Israel, Lufthansa also supports the ornithological institute of the Israeli nature conservation society SPNI. The focus here is on satellite-based, scientific monitoring of migrating cranes.



#### International Crane Foundation (ICF)

The International Crane Foundation is responsible for numerous crane protection projects in the USA and other parts of the world. Lufthansa supports this organization, financially and logistically, in efforts such as setting up international crane conferences and conventions.

→ [www.savingcranes.org](http://www.savingcranes.org)



#### South African Crane Working Group (SACWG)

In Africa, too, Lufthansa is committed to preserving the cranes. At the Cape, the company supports the conservation efforts of the South African Crane Working Group, which works to protect the three South African species – Wattled, Blue and Gray Crowned cranes – and their habitats.

→ [www.ewt.org.za](http://www.ewt.org.za)

areas, which were practically untouched by human activity, have produced a unique flora and fauna. In the mountains along the border between Albania and Macedonia, for instance, Euronatur is working for full protection to assure the survival of the Balkan lynx, now threatened by extinction. The population of this shy wildcat, which is indigenous to the southern Balkans, numbers as few as 100 individuals. The "Balkan Green Belt" project is supported by Germany's Federal Ministry for the Environment and Nature Conservation (BfN) and others. It is considered a symbol for cross-border, sustainable development and cooperation in nature conservation.

→ [www.euronatur.org](http://www.euronatur.org)

→ [www.bfn.de](http://www.bfn.de)

### **Engine for innovation: Lufthansa Cargo is constructing a new animal handling center**

Lufthansa Cargo cooperates closely with international animal and species protection organizations to guarantee that animals are loaded and transported as gently as possible. The new animal handling center, which has been under construction on the north side of Frankfurt Airport since October 2006, will serve this aim as well. The logistics company will bundle all departments concerned with animal shipments in the new state-of-the-art building with a surface of 3,750 square meters. The building is set to be completed by the beginning of 2008.

Every year, Lufthansa Cargo handles more than 20,000 consignments of "living freight." Whenever official proof regarding an animal's origin is unavailable, carriage is automatically declined. Lufthansa Cargo also refuses to transport all wild animals caught in their natural habitats as a matter of principle. The same applies to whales, dolphins and all species threatened by extinction and banned from being traded under Annex 1 of the Washington Convention on International Trade in Endangered Species (CITES) – with very few exceptions (such as transports between zoos) these species stay on the ground at Lufthansa Cargo.



### **CMS: Help for migratory species**

Migratory species face serious dangers, to which climate change adds new risks nearly every day. Increasingly, habitats are being lost as fertile soils turn into steppes or water becomes scarce. To help ensure that migrations do not become voyages of no return, the Bonn Convention of Migratory Species of Wild Animals (CMS) has been working for 25 years for the protection of migratory species. To support the Convention, Lufthansa and National Geographic Deutschland have endowed an international dissertation prize. It will be given for the second time this year, following its launch in 2004. Offering prize money of 10,000 euros, the "UNEP/CMS Thesis Award" is given every three years to honor exceptional research work on the biology of migratory species. In addition, Lufthansa is one of the founding members of the support group "Friends of CMS." Now in the process of launching its first projects, this initiative includes representatives of business, politics, science and the media.

→ [www.cms.int](http://www.cms.int)

## Glossary

**ACARE** Advisory Council for Aeronautics Research in Europe. Created in 2001, the ACARE council consists of representatives from the EU member states, EU Commission, Eurocontrol, the European aerospace industry, research institutions and others. Its main task is to develop and implement the strategic research agenda (SRA) for Europe's aerospace sector.  
→ [www.acare4europe.org](http://www.acare4europe.org)

**AEA** Association of European Airlines.  
→ [www.aea.be](http://www.aea.be)

**Atmosphere** The whole mass of air surrounding the Earth. It is divided into various layers, distinguished from one another by distinct differences in vertical bands of temperature. Important for air traffic are the two lower layers: the troposphere and the stratosphere, lying above that. The troposphere's upper boundaries vary depending on season and latitude. They lie at altitudes of 16 to 18 kilometers above sea level at the equator, and at 8 to 12 kilometers above sea level at the poles. The temperature in the tropopause, the transition layer between troposphere and stratosphere, drops to only about minus 60 degrees Celsius. It rises again in the stratosphere. There the concentration of water vapor is extremely low. The so-called ozone layer is also located in the stratosphere at altitudes of about 25 to 30 kilometers. Today's commercial aircraft fly at cruising altitudes of between 8 and 13 kilometers. According to the latest research, air traffic emissions do not have a direct impact on the ozone layer.

**B.A.U.M.** Bundesdeutscher Arbeitskreis für Umweltbewusstes Management e.V. (Federal Working Group for Environmentally-Aware Management). B.A.U.M. was founded in 1984 as the first independent environmental initiative of German business. At currently 450 members, it is the largest of its kind in Europe. Lufthansa has been a member of the Working Group since 1997.  
→ [www.baumev.de](http://www.baumev.de)

**Carbon dioxide (CO<sub>2</sub>)** Gas resulting in nature from the burning or decomposition of organic masses (e.g. plant material) and from the breathing process of humans and animals. The greenhouse gas CO<sub>2</sub> remains for about 100 years in the atmosphere. Scientists attribute the increase of atmospheric CO<sub>2</sub> over the last 100 years to the burning of fossil fuels (e.g. coal, oil, natural gas) by humans. Per ton of fuel, 3.154 tons of CO<sub>2</sub> result from the combustion process. Currently, about 2 percent of man-made CO<sub>2</sub> emissions are due to air traffic.

**Carbon monoxide (CO)** Chemical compound consisting of one carbon and one oxygen atom, formed in the incomplete combustion process of substances containing carbon. For aircraft engines, the level of CO emissions depends greatly on the thrust level: The emissions per kilogram of fuel

burned are higher at idle settings, while taxiing and on approach than during the climbing and cruising phases.

**Catering** Internationally used term for the supplies loaded aboard an aircraft, including in-flight meals and service items.

**CDA** Continuous Descent Approach. Procedure for a flight's approach phase that reduces noise emissions 20 to 40 kilometers ahead of the runway threshold (Frankfurt). At Frankfurt Airport, it can only be used at night due to capacity restrictions.

**Change Management** Change Management comprises all the measures a company uses to introduce or adapt to change. The more intensively employees are informed about and involved in the processes of change, the more successful these changes will be.

**Chapter-4 aircraft** Aircraft that meet the regulations of the strictest noise protection standard currently in force – the Chapter-4 noise standard. The Environmental Committee (CAEP) of the ICAO agreed on this standard in September 2001. As a result, all aircraft newly certified from 2006 must remain cumulatively below the Chapter-3 noise levels by 10 decibels or more. The maximum noise emission values for aircraft were introduced by the ICAO under Annex 16 to the convention on international civil aviation. Noise levels are measured at three measuring points: at 6,500 meters from the beginning of the runway (brake-release point) and 450 meters to the side of the runway for takeoffs (sideline), and at 2,000 meters in front of the runway threshold (approach) for landings. The latter corresponds to a flyover altitude of about 120 meters. The permitted values depend on the aircraft's maximum take-off weight and number of engines.

**Corporate Social Responsibility (CSR)** A company's responsibilities toward society at large, or "corporate citizenship." CSR refers to a company's voluntary efforts in the area of society.

**Corporate university** Corporate education institution for professionals and managers. See also Lufthansa School of Business (LHSB).

**Decibel (dB)** Measuring unit for the intensity and pressure of sound. The difference in intensity between the softest sound the human ear can perceive and the pain threshold is 1:10 trillion. To depict this enormous range objectively, acoustics uses the logarithmic decibel scale. On this scale, the value "0" is assigned to the perception threshold (for a sound of 1,000 Hz) and the pain threshold at the value "130." An increase of 10 dB corresponds to a tenfold increase in the sound's intensity. For the perceived volume, a difference of 10 dB corresponds to half or double the volume. However, the human ear is not equally sensitive

across the entire range of frequencies. Low and high sounds are not perceived as being equally loud even at the same intensity. For measurements, this difference is equalized and noted accordingly. The best known such notation is the "A value," marked by the index dB(A). To measure aircraft noise, the EPNdB (Effective Perceived Noise Decibel) unit is used internationally.

**Deicing** An aircraft cannot take off with ice and snow on its wings and horizontal stabilizers. Such accumulations alter the aerodynamics and thus imply an enormous safety risk. For this reason, aircraft are forbidden to take off when they are covered by hoarfrost, snow or ice. Under wintry weather conditions, an aircraft's critical surfaces must be deiced with a mixture of water, propylene glycol and alcohol, which also protects them from icing over again (deicing/antiicing). On average, about 900 liters of deicing fluid are required to deice a Boeing 747 each time. By comparison, only 300 liters are needed for a Boeing 737. This deicing fluid is almost completely biodegradable and poses no danger for the environment. On an average winter day, about 65,000 liters of deicing fluid are used at German airports. On dry days with freezing temperatures, this figure is significantly lower.

**Deutsches Netzwerk Wirtschaftsethik (dnwe)** German Network for Business Ethics. dnwe is a nonprofit organization, in which Lufthansa has been a member since January 1998 (Lufthansa double membership in dnwe and EBEN since January 1998). dnwe has about 450 current members, including many from German business, politics, religion and science. At the same time, dnwe is a national association of the European Business Ethics Network (EBEN).  
→ [www.dnwe.de](http://www.dnwe.de)

**Diversity** In a corporate context, diversity refers to all characteristics that distinguish employees from one another. Diversity management offers approaches for handling human differences for the benefit of company and employees alike.

**DLR** German Aerospace Center. The DLR serves scientific, economic and social purposes. It maintains 30 institutes, testing facilities and operational sites. Its goal is to help – using the means of aviation and space flight – to secure and shape the future. In its work, the DLR also seeks cooperation and allocation of research tasks among European partners.  
→ [www.dlr.de](http://www.dlr.de)

**Dow Jones Sustainability World Index** The leading sustainability index worldwide lists the top 10 percent of companies in each industry, whose sustainable approach to corporate management is exemplary. Lufthansa was again listed in 2006.

**econsense** econsense – Forum for Sustainable Development of German Businesses is an association of globally active corporations and organizations in German industry that have integrated the guiding principle of sustainable development into their corporate strategies. Lufthansa has been a member of this cross-industry network since its foundation in 2000.

→ [www.econsense.de](http://www.econsense.de)

**Elder Care** Term for giving care to older next of kin. Elder care is part of Diversity Management. When needed, the Lufthansa Family Service advises employees on care options for family members in need.

**EMAS** Environmental Management and Audit Scheme, colloquially referred to as EU eco-audit regulations. European regulations concerning environmental management and certification.

**Employee shares** Employee shares are usually offered to staff at preferential prices and with favorable terms of payment. Ordinarily, they are subject to a blocking period, during which they may not be sold.

**Equivalent continuous noise level (Leq)** The Leq is a measure for the energetic average of all sound pressure levels over a defined period of time. All sound events that differ in intensity and duration are summarized according to mathematical rules. The resulting average value is an accepted and proven measurement of the “noise quantity” occurring over an observed time interval.

**Export guarantees** Known in Germany as “Hermes guarantees.” They serve to open up difficult markets and protect German companies from losses due to default by business partners abroad. The country where the exporting company has its headquarters assumes part of the export risk through its Export Credit Agency.

**Freight performance (FTKO/FTKT)** Airlines distinguish between freight performance offered (FTKO, freight ton kilometers offered) as part of its total performance offered and its sold freight performance (FTKT, freight ton kilometers transported) as part of its total performance sold. See also ton kilometers.

**FTSE4Good** Index introduced by the Financial Times and the London Stock Exchange in 2001. The FTSE4Good lists only companies with above-average performance in the areas of human rights, social standards and environmental protection. Lufthansa has been listed since 2001.

**Fuel dump** Dumping of fuel in-flight due to emergency situations. A procedure used on long-haul aircraft (Airbus A330, Airbus A340, Boeing 747, Boeing 767, MD-11) before unscheduled landings (e.g. in the event of technical problems or serious passenger illness) to decrease the aircraft's weight to the maximum permissible landing weight. In the

event of a fuel dump, special airspace is assigned to the aircraft, if possible above uninhabited or thinly populated areas. Fuel is usually dumped at altitudes of 4-8 kilometers. A minimum altitude of 1,500 meters and a minimum speed of 500 km/h are required. The aircraft may not fly a fully closed circle. The dumped kerosene forms a fine mist in the turbulence behind the aircraft. Despite the use of highly sensitive methods of analysis, no contamination has been determined so far in plant or soil samples after fuel dumps.

**Functional Airspace Block (FAB)** A Functional Airspace Block is a unit of airspace defined in accordance with operational requirements. Priority is given in this case to the requirements of integrated airspace management across national borders.

**Global Compact** Global network in whose context the United Nations cooperates with private-sector corporations and civil action organizations to advance human rights, labor standards, environmental protection and anti-corruption measures.  
→ [www.unglobalcompact.org](http://www.unglobalcompact.org)

**Greenhouse gases** Gaseous substances that contribute to the greenhouse effect and have both natural and human (anthropogenic) causes. The most important natural greenhouse gases are water vapor (H<sub>2</sub>O), carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>); the most important anthropogenic greenhouse gas is carbon dioxide from the combustion of fossil fuels. It accounts for about 77 percent of the greenhouse effect attributable to human activities. Methane, primarily generated by agriculture and large-scale animal husbandry, contributes about 14 percent to the anthropogenic greenhouse effect. Other artificial greenhouse gases are nitrous oxide (N<sub>2</sub>O), fluorocarbons (FCs and HFCs), sulfur hexafluoride (SF<sub>6</sub>) and chlorofluorocarbons (CFCs). Source: World Resources Institute (WRI), 2005.

**IATA** International Air Transport Association. The general organization of international commercial aviation.  
→ [www.iataonline.com](http://www.iataonline.com)

**ICAO** International Civil Aviation Organization. A United Nations agency that develops internationally binding norms for civil aviation.  
→ [www.icao.int](http://www.icao.int)

**ICC Deutschland** German chapter of the International Chamber of Commerce. The ICC was founded in 1919 as the World Business Organization. More than 1,500 business organizations and over 5,000 corporations are organized in the worldwide framework of the ICC.  
→ [www.icc-deutschland.de](http://www.icc-deutschland.de)

**Initiative Pro Recyclingpapier** Founded in 2000, the initiative unites various industries and aims at improving the acceptance of recycling paper. Lufthansa is one of the initiative's founding members.  
→ [www.papiernetz.de](http://www.papiernetz.de)

**Intermodal transport** Transport system that uses at least two modes of transport – such as train and plane – integrated in a transport chain to carry people or goods from door to door. Thanks to a global approach, existing transport capacities can be used more efficiently.

**IPCC** Intergovernmental Panel on Climate Change. An international UN panel of experts on climate change, founded in 1988 by the World Meteorological Organization (WMO) and the United Nations Environmental Program (UNEP).  
→ [www.ipcc.ch](http://www.ipcc.ch)

**ISO 14001** International environmental management system. It allows companies to anchor environmental protection in their organization in a systematic manner.  
→ [www.iso.org](http://www.iso.org)

**Kerosene** Fuel for jet and propeller engines that is chemically similar to petroleum. Like diesel fuel or gasoline, kerosene is produced by distilling crude oil; unlike these fuels, kerosene does not contain halogenated additives. Due to its manufacturing process, it does not contain benzene hexachloride ether. Worldwide, aircraft currently consume almost 170 million tons of kerosene per year. This represents about 5–6 percent of the world's total crude oil production.

**Kyoto Protocol** Codifies binding goals for reducing emissions of greenhouse gases. It was passed in 1997 as an amendment to the protocol concerning the formulation of the United Nations Framework Convention on Climate Change (UNFCCC) and was ratified in February 2005.

**Lufthansa School of Business (LHSB)** Germany's first corporate university. It has received multiple awards for the worldwide standards it establishes for the development and training of professionals and managers. The LHSB supports processes of change within the Group and promotes a shared management culture.

**Managing volatility (“Fit for change”)** Lufthansa initiative that supports managers and employees in reacting swiftly and flexibly to unexpected events, e.g. through workshops that teach and develop relevant methods.

**Mentee** Junior employee who is supported by an experienced mentor in his or her personal and professional development.

**Mentor** Experienced specialist or manager who passes on his or her know-how to a junior employee and facilitates contacts.

**Mentoring** Instrument for targeted support of junior employees. Focuses on regular personal contacts between mentor and mentee.

**MRO** Acronym standing for maintenance, repair and overhaul of aircraft.

**Nitrogen oxides (NO<sub>x</sub>)** Chemical compounds consisting of one nitrogen and several oxygen atoms. NO<sub>x</sub> is defined as the sum of NO and NO<sub>2</sub> compounds. Natural sources include lightning and microbes in the soil. Nitrogen oxides are also generated in combustion processes under high pressures and temperatures. Both of these parameters have been increased in modern aircraft engines to significantly reduce fuel consumption as well as emissions of carbon monoxide and unburned hydrocarbons. However, future combustion chambers of an advanced design could help reduce NO<sub>x</sub> emissions by 85 percent. Depending on the type of aircraft and operational conditions, this value varies between 6 and 20 kilos per ton of fuel burned. Air traffic has a share of 2–3 percent in manmade NO<sub>x</sub> emissions. Climate models show that nitrogen oxides have increased the concentration of ozone at cruising altitudes by a few percentage points.

**OHSAS 18001** Occupational Health and Safety Assessment Series. Job safety management system, developed by the British Standards Institution in cooperation with international certification organizations.

**Ozone (O<sub>3</sub>)** Molecule consisting of three oxygen atoms formed in the stratosphere. The ozone layer located in the stratosphere has an important protective function, as it absorbs harmful ultraviolet light. While ozone at higher altitudes is broken down massively by chlorofluorocarbons (CFCs), it develops close to the ground under the influence of sunlight from numerous precursor substances ("summer smog") and irritates the mucous membranes. At current levels, nitrogen oxide emissions from air traffic at cruising altitudes cause an increase in atmospheric ozone, analogous to the generation of summer smog, estimated by scientists at 3–4 percent on the heavily-flown North Atlantic routes.

**Partners for Innovation** Lufthansa has been a Partner for Innovation since 2005. More than 200 companies, associations and institutions participate in this initiative. Its goal is to bundle the scientific and strategic know-how of its members and to translate innovative ideas into marketable products.  
→ [www.innovationen-fuer-deutschland.de](http://www.innovationen-fuer-deutschland.de)

**Passenger kilometers (PKO/PKT)** Measure for transport performance in passenger carriage (number of passengers multiplied by distance flown). Here one distinguishes between available transport performance (PKO, passenger kilometers offered) or synonymously SKO, seat kilometers offered) and actual transport performance (PKT, passenger kilometers transported).

**Seat kilometers (SKO)** Measure for the transport capacity available (SKO, seat kilometers offered).

**Seat load factor** Passenger-related measure of utilization of aircraft: The ratio of transport performance (PKT, passenger kilometers transported) to capacity (PKO, passenger kilometers offered).

**Senior professionals** A company's older, experienced employees.

**Single European Sky (SES)** Unified European airspace. This initiative of the European Union aims at optimizing traffic flows, standardizing licenses for air traffic controllers, harmonizing technology and thus maintaining safety, capacities and punctuality in growing air transport.

**Slot** Designated point in time at which an airline may use an airport's runway for takeoff or landing.

**Stakeholders** Groups or individuals who formulate their demands on a company (e.g. attainment of corporate goals) and pursue these either personally or through representatives. This includes shareholders, employees, customers, suppliers and others.

**Sustainable development** According to the guiding principle of sustainable development formulated in 1987 by the World Commission for Development and the Environment (Brundtland Commission), "sustainable development is a form of development that meets the needs of today's generation without jeopardizing the abilities of future generations to satisfy their own." For businesses, this means acting responsibly not only in economic matters but also in environmental and social issues. All three aspects – economic, ecological and social – must be kept in balance.

**Telework** Transfer of the workplace, e.g. to the home. Access to corporate data is provided via the Internet.

**Ton kilometers (TKO/TKT)** Measure of transport performance (payload multiplied by distance). One distinguishes between available transport performance (TKO, ton kilometers offered) and the actual transport performance (TKT, ton kilometers transported). In calculating payloads, passengers are taken into account by means of a statistical average weight.

**Trace gases** Gases of which there are only very small amounts present in the atmosphere (e.g. ozone, methane, nitrous oxide, etc.) but which are of great significance for the Earth's climate and the chemical processes in the atmosphere.

**Transparency International** Anti-corruption organization, of which Lufthansa has been a member since 1999.  
→ [www.transparency.de](http://www.transparency.de)

**Unburned hydrocarbons (UHCs)** Organic mixture of carbon and hydrogen that results from the incomplete combustion of fuels containing hydrocarbons or from the evaporation of fuel.

**UNEP** The United Nations Environmental Program.  
→ [www.unep.org](http://www.unep.org)

**UN Global Compact** see Global Compact.

**UN World Decade "Education for Sustainable Development"** Proclaimed by the UN plenary session in 2002 for the period 2005 to 2014. Its goal is to anchor the principles of sustainable development worldwide in the national educational systems.  
→ [www.dekade.org](http://www.dekade.org)

**Volatile Organic Compounds (VOCs)** Volatile organic substances that are characterized by high steam pressure and thus evaporate easily into the atmosphere at room temperature. VOCs are present in solvents, cleaning agents, fuels and other substances. In the presence of nitrogen oxides and intense sunlight, VOCs lead to the generation of ozone.

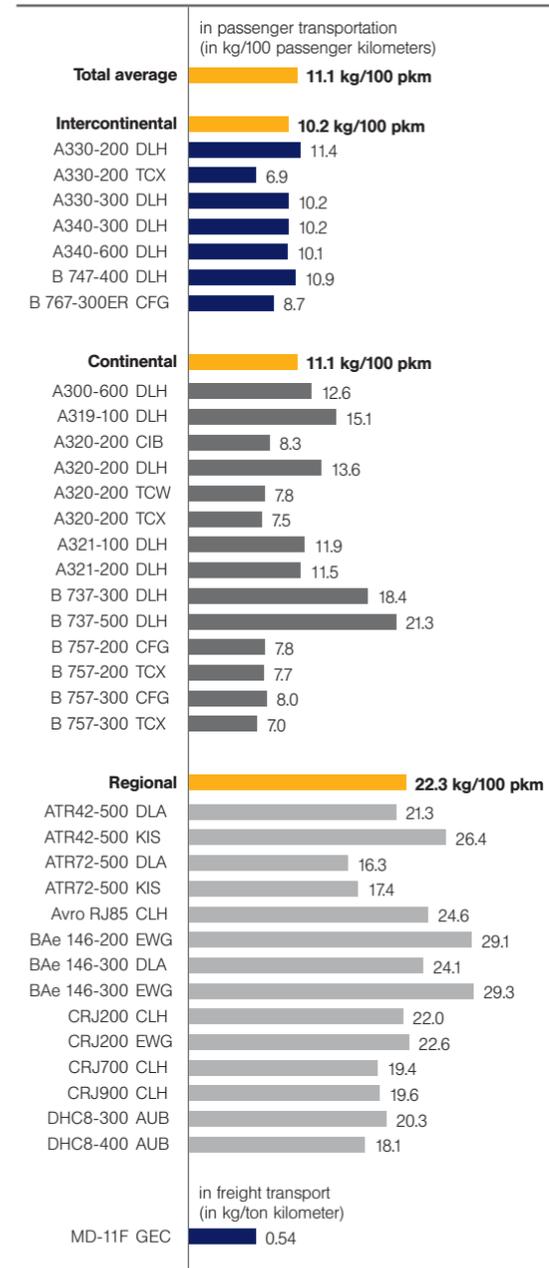
**Water vapor** Water vapor is the most important greenhouse gas, even ahead of carbon dioxide. Without water vapor from natural sources, the Earth's surface would be around 22 degrees Celsius cooler. This makes water vapor responsible for two-thirds of the natural greenhouse effect (33 degrees Celsius). For each kilo of kerosene burned, 1.24 kilos of water vapor are released. Concerns that air traffic might increase the concentration of water vapor in the stratosphere and thus change the climate have been refuted by scientific research. The German Aerospace Center (DLR) concluded that even a one hundred-fold increase in the quantity of water vapor emitted by air traffic would not result in a detectable climatic signal.

**Work-life balance** Refers to a healthy equilibrium between work and private life.

# Fleet overview: CO<sub>2</sub> and NO<sub>x</sub>

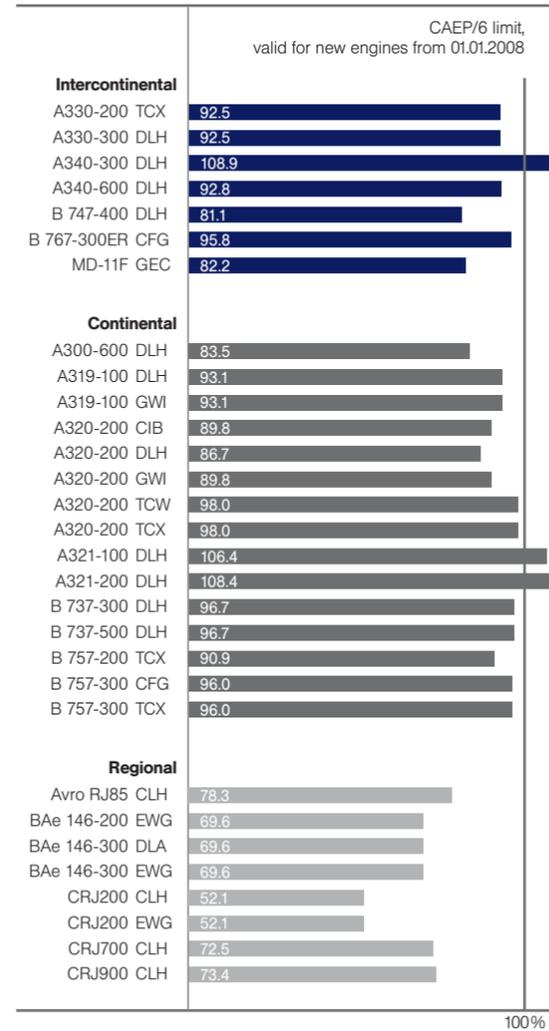
## Specific CO<sub>2</sub> emissions by type of aircraft

Lufthansa Group fleet (active fleet in 2006)



## NO<sub>x</sub> emissions by type of aircraft in comparison with the future CAEP/6 limit in percent

(active jet fleet on 31.12.2006)



AUB = Augsburg Airways  
 CFG = Condor Flugdienst  
 CIB = Condor Berlin  
 CLH = Lufthansa CityLine  
 DLA = Air Dolomiti  
 DLH = Lufthansa Passenger Airline  
 EWG = Eurowings  
 GEC = Lufthansa Cargo  
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You can find contact partners in the Lufthansa Group companies at:

→ <http://responsibility.lufthansa.com>

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<http://responsibility.lufthansa.com>

**Paper and printing process**  
 RecyStar, recycling paper made from 100% recycled paper.  
 Produced without optical brightening agents, without chlorine bleach. Certificate: Environmental label "Blue Angel."

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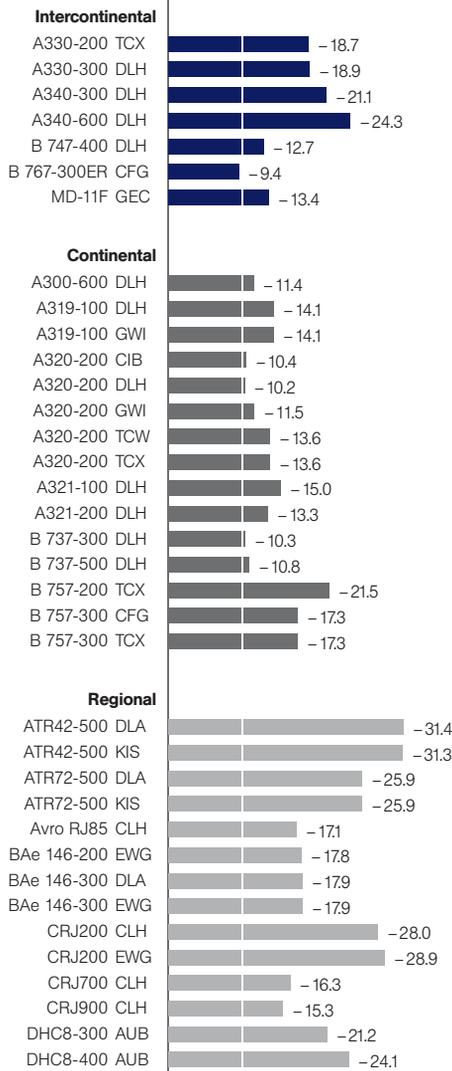
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*Balance* is a registered title.

## Fleet overview: Noise and fuel consumption

### Margins below the noise limit of ICAO Chapter 3\*

Lufthansa Group fleet (active fleet on 31.12.2006)  
in EPNdB

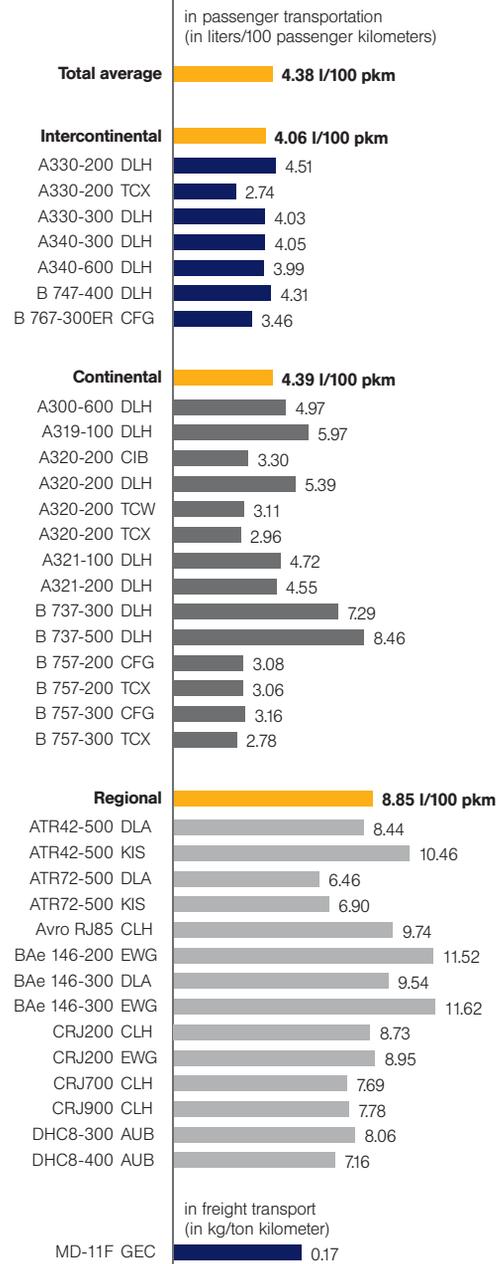


\* New limit according to ICAO Chapter 4, binding since 2006 for new aircraft: -10.0 EPNdB compared with Chapter 3

AUB = Augsburg Airways  
CFG = Condor Flugdienst  
CIB = Condor Berlin  
CLH = Lufthansa CityLine  
DLA = Air Dolomiti  
DLH = Lufthansa Passenger Airline  
EWG = Eurowings  
GEC = Lufthansa Cargo  
GWI = Germanwings  
KIS = Contact Air  
TCW = Thomas Cook Belgium  
TCX = Thomas Cook UK

### Specific fuel consumption by type of aircraft

Lufthansa Group fleet (active fleet in 2006)



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