



Issue 2017

# Balance

Key data on sustainability within the Lufthansa Group

A woman in a dark sleeveless dress is shown in profile, interacting with a large digital world map. She is pointing at a glowing green airplane icon on the map with her right hand, while holding a tablet in her left hand. The map is overlaid with various flight routes and aircraft icons, including labels like 'A350 FRA -> JFK' and 'A320 JNB -> MAD'. To the left of the map, there are abstract digital graphics consisting of a globe with a network of lines and nodes, and a circular pattern of dots.

Cover story  
#DigitalAviation

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# About this report

*Balance*, the Lufthansa Group's Sustainability Report, informs stakeholders and the interested public about the Group's goals, activities and advances in the areas of business, social responsibility, environment, product and corporate citizenship. The data presented in this report complements and expands the information in the Annual Report.

Across the Lufthansa Group, Corporate Responsibility is understood to comprise the following dimensions:

- Economic sustainability
- Corporate governance and compliance
- Climate and environmental responsibility
- Social responsibility
- Product responsibility
- Corporate citizenship

Reporting follows the Global Reporting Initiative's G4 guidelines ("core option"). This publication also serves as a progress report concerning the implementation of the ten principles of the UN Global Compact, which the Lufthansa Group joined in 2002. The Group determined the most significant topics related to sustainability in 2016 in the context of a materiality analysis, which is based on the results of a stakeholder survey.

## Scope of consolidation and comparability

Unless noted otherwise, the data in this report refers to the financial year 2016. You will find explanations concerning the scope of consolidation and calculation methods used to determine the absolute and specific resource consumption at the Lufthansa Group on page 85. This report covers the activities of the Lufthansa Group. Reporting restricted to individual Group companies is indicated in the copy. Due to changes in the portfolio over recent years, the figures for personnel and environmental performance cited in this report are only to a limited extent comparable with those reported for previous years. There are also certain differences in approach compared to the Annual Report when calculating passenger numbers and their derivative performance indicators (see explanations relating to the overview on page 2, At a glance).

## Publication dates of this report

*Balance*, the Lufthansa Group's Sustainability Report, is published once a year in German and in English. The preceding edition was published on July 14, 2016. The Group has regularly reported about its environmental performance since 1994 and has continuously expanded its reporting to the other dimensions of entrepreneurial responsibility.

## Additional information on the Internet

In addition to this report, the Lufthansa Group informs readers via the Internet about its activities in the area of sustainability:

 [www.lufthansagroup.com/responsibility](http://www.lufthansagroup.com/responsibility)

## 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, estimate, count on, can, could, should or endeavor*. These forward-looking statements are based on all the discernible information, facts and expectations available at the time.

It is possible that the Group's actual results and development may differ materially from the forward-looking statements implied by the forecasts. The Lufthansa Group assumes no obligation for and does not intend 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 does it give any guarantee for the actuality, accuracy and completeness of this data and information.

## Note

The terms *Lufthansa Group, Group, aviation group, Company and aviation company* are used synonymously in this report.

**1** Taken from the Annual Report 2016 of the Lufthansa Group. **2** For the reporting year 2016, the following companies have been included in *Balance*: Lufthansa (including Lufthansa CityLine and Air Dolomiti), Lufthansa Cargo, SWISS (including Edelweiss Air), Austrian Airlines and Eurowings (including Germanwings). Excluding the services of third parties, i.e. airlines outside the scope of consolidation of *Balance*, but that take over services from Lufthansa, for example in the event of capacity bottlenecks (see page 86, table "Share of third parties"). **3** Types of flights taken into account: all scheduled and charter flights. **4** See page 86 "Fuel consumption". **5** *Balance*: segments (operational perspective); Annual Report: distance (customer perspective). One distance can include several segments, e.g. in the event of stops en route. **6** *Balance*: on the basis of all passengers aboard; Annual Report: on the basis of all revenue passengers. **7** Companies referred to as in 2, but including the services of third parties, as these contribute to the Group's results. Types of flights as in 3, but including ferry flights, as these represent costs.

<b>Business performance data<sup>1</sup></b>		<b>2016</b>	<b>2015</b>	<b>Change</b>
Revenue	million €	<b>31,660</b>	32,056	-1.2%
of which traffic revenue	million €	<b>24,661</b>	25,506	-3.3%
EBIT	million €	<b>2,275</b>	1,676	+35.7%
Adjusted EBIT	million €	<b>1,752</b>	1,817	-3.6%
EBITDA	million €	<b>4,065</b>	3,395	+19.7%
Net profit/loss for the period	million €	<b>1,776</b>	1,698	+4.6%
Total assets	million €	<b>34,697</b>	32,462	+6.9%
Cash flow from operating activities	million €	<b>3,246</b>	3,393	-4.3%
Capital expenditure (gross)	million €	<b>2,236</b>	2,569	-13.0%
Equity ratio	percent	<b>20.6</b>	18.0	+2.6 PP

<b>Personnel data</b>		<b>2016</b>	<b>2015</b>	<b>Change</b>
Number of employees (on December 31, respectively)		<b>124,306</b>	120,652	+3.0%
of these, in Germany		<b>68,181</b>	66,920	+1.9%
of these, outside Germany		<b>56,125</b>	53,732	+4.5%
Staff costs	million €	<b>7,354</b>	8,075	-8.9%
Revenue/employee	thousand €	<b>257</b>	268	-4.2%
Staff costs/revenue	percent	<b>23.2</b>	25.2	-2.0 PP
Average age	years	<b>42.2</b>	42.3	-0.1 years
Part-time ratio, absolute	percent	<b>27.4</b>	28.8	-1.4 PP
Part-time ratio, men	percent	<b>14.0</b>	14.9	-0.9 PP
Part-time ratio, women	percent	<b>43.4</b>	45.7	-2.3 PP
Share of women in management (Germany)	percent	<b>16.9</b>	16.2	+0.7 PP
Share of women in management (worldwide)	percent	<b>15.6</b>	14.9	+0.7 PP

<b>Environmental data<sup>2,3</sup></b>		<b>2016</b>	<b>2015</b>	<b>Change</b>
<b>Resource consumption</b>				
Fuel consumption <sup>4</sup>	tonnes	<b>9,055,550</b>	8,947,766	+1.2%
Fuel consumption, specific, passenger transportation	l/100pkm	<b>3.85</b>	3.84	+0.2%
Fuel consumption, specific, freight transport	g/tkm	<b>224</b>	225	-0.7%
<b>Emissions</b>				
Carbon dioxide emissions	tonnes	<b>28,524,981</b>	28,185,463	+1.2%
Carbon dioxide emissions, specific, passenger transportation	kg/100pkm	<b>9.71</b>	9.69	+0.2%
Nitrogen oxide emissions	tonnes	<b>139,008</b>	135,447	+2.6%
Nitrogen oxide emissions, specific, passenger transportation	g/100pkm	<b>47.0</b>	46.3	+1.5%
Carbon monoxide emissions	tonnes	<b>19,320</b>	19,137	+1.0%
Carbon monoxide emissions, specific, passenger transportation	g/100pkm	<b>7.1</b>	7.1	-0.2%
Unburned hydrocarbons	tonnes	<b>1,880.4</b>	1,858.8	+1.2%
Unburned hydrocarbons, specific, passenger transportation	g/100pkm	<b>0.7</b>	0.7	+0.6%

<b>Transport performance data</b>		<b>Balance<sup>2,3</sup></b>	<b>± 2015</b>	<b>Annual Report<sup>7</sup></b>	<b>± 2015</b>
Flights <sup>5</sup>		<b>936,430</b>	<b>0.6%</b>	1,021,919	+1.8%
Passengers carried <sup>6</sup>		<b>105,940,389</b>	<b>1.3%</b>	109,670,000	+1.8%
Seat kilometers offered, SKO	million pkm	<b>279,250</b>	<b>3.1%</b>	286,555	+4.6%
Freight tonne kilometers offered, FTKO	million tkm	<b>14,642</b>	<b>0.2%</b>	15,117	+1.0%
Tonne kilometers offered, TKO	million tkm	<b>42,574</b>	<b>2.1%</b>	43,607	+7.9%
Passenger kilometers transported, PKT <sup>6</sup>	million pkm	<b>226,485</b>	<b>1.2%</b>	226,633	+2.8%
Freight tonne kilometers transported (including third-party performance), FTKT	million tkm	<b>9,279</b>	<b>1.2%</b>	10,071	+1.4%
Tonne kilometers transported, TKT	million tkm	<b>31,992</b>	<b>1.2%</b>	32,300	+7.9%

## Dear Readers,

Digitalization is changing all areas of society and business. In aviation as well, digital solutions are driving the evolution of product and service offers. This trend is irreversible. It opens up a universe of opportunities and allows us to embark on new paths – with the customer experience in mind, but also with regard to our business segments. For this reason, we have made 2017 the Year of Digitalization across the Group and adopted the motto: Digitalization is one of the keys to the future for us. We have launched important digitalization projects in all areas of the Company – beginning with paperless aircraft maintenance and eJournals on board to eFreight at Lufthansa Cargo and virtual reality in pilot training. The largest current project in this domain is equipping all our short- and medium-haul aircraft with broadband Internet access.

Our goal is a comprehensive and sustainable mobility concept, tailor-made to the customer's individual wishes. To achieve this, digitalization along the entire travel chain plays a central role. It is not least our digitalization programs that allow optimized processes, improved services and faster communication – and they support the green transformation.

For this reason, we have dedicated the cover story “#DigitalAviation” in this sustainability report to digitalization and would like to show you with a number of examples how this topic “moves” us quite literally.

Movement continues to be a driving force in the area of the modernization of the Lufthansa Group's fleet. In 2016, we integrated 47 new aircraft into our Group's fleet and this year we again expect a new aircraft almost every week. The current high point of our fleet renewal is the Airbus A350-900, the most modern and environmentally friendly long-haul aircraft. In December 2016, we received the first A350 of 25 aircraft on order. With the commissioning of the A320neo at Lufthansa and the Bombardier C Series at SWISS, there were even two world premieres during the reporting year. But the most important consideration is: With each new aircraft in operation we reduce our operating costs by 20 percent and make an important contribution to noise reduction and environmental protection.

By having supported the UN Global Compact since 2002, we emphasize our continued commitment to fulfilling our responsibility for environmental and social issues alongside economic aspects. This also includes continuing to make ongoing contributions to society.

I thank you for your interest in our work and wish you a sustainably captivating read.



Carsten Spohr  
Chairman of the Executive Board and CEO  
Deutsche Lufthansa AG



**“Our digitalization programs allow optimized processes, improved services and a faster communication – and they support the green transformation.”**

Carsten Spohr

# THE LUFTHANSA GROUP

The Lufthansa Group is an aviation company with worldwide operations and more than 550 subsidiaries and affiliated companies. The portfolio of companies comprises network airlines, point-to-point airlines, and aviation service companies.

In 2016, the airlines of the Lufthansa Group carried 109.7 million passengers and thus established a new passenger record.

 [www.lufthansagroup.com](http://www.lufthansagroup.com)

## THE SETUP OF THE LUFTHANSA GROUP

### Network airlines



The premium airlines Lufthansa, SWISS and Austrian Airlines within the Lufthansa Group offer their customers an integrated travel experience via their hubs as well as the highest standards of service and comfort. Being members of the Star Alliance, the world's largest aviation alliance, their passengers enjoy numerous advantages.

[www.LH.com](http://www.LH.com) | [www.swiss.com](http://www.swiss.com) | [www.austrian.com](http://www.austrian.com)

### Point-to-point airlines



With the Eurowings brand the Lufthansa Group offers an innovative and competitive product on point-to-point routes for price-sensitive and service-oriented customers. In 2017, wet-leasing additional capacities from Air Berlin and the complete acquisition of Brussels Airlines added further platforms.

[www.eurowings.com](http://www.eurowings.com) | [www.brusselsairlines.com](http://www.brusselsairlines.com)

### Aviation services

As leaders in the world market, the service companies strengthen the Lufthansa Group's portfolio.

#### **Lufthansa Cargo**

Lufthansa Cargo AG, with headquarters in Frankfurt, is the Lufthansa Group's specialist for logistics and Europe's leading cargo airline.

[www.lufthansa-cargo.com](http://www.lufthansa-cargo.com)

#### **Lufthansa Technik**

Lufthansa Technik AG, with headquarters in Hamburg, is the world's leading manufacturer-independent provider of maintenance, repair and overhaul services for civil commercial aircraft.

[www.lufthansa-technik.com](http://www.lufthansa-technik.com)

#### **LSG**group

The LSG Group is the world's leading provider of comprehensive in-flight products and services. The group's parent company, LSG Lufthansa Service Holding AG, is headquartered in Neu-Isenburg.

[www.lsgskychefs.com](http://www.lsgskychefs.com)

## AT A GLANCE



**Corporate headquarters**  
Cologne



**Legal form**  
Stock corporation



**Number of employees  
on 31.12.2016**  
124,306



**Number of nationalities**  
144



**Number of passengers in 2016**  
109.7 million



**Hubs**  
Frankfurt, Munich, Zurich, Vienna



**Number of aircraft in the Group's fleet**  
617



**Number of destinations  
(summer timetable 2017)**  
308 cities in 103 countries

## 1 DAY AT THE LUFTHANSA GROUP



**2,799**  
flights



**1.72 million**  
meals



**1,700**  
aircraft supported



**300,547**  
passengers

# # Digital Aviation

Quality



Innovation



Efficiency



From the Internet of Things via big data to smart homes: digitalization is a megatrend. Already, intelligent and interconnected systems shape our public and private lives. For some time now, digitalization has permeated almost all aspects of aviation, with enormous consequences on existing processes and products. The capabilities of information technology offer the Lufthansa Group concrete opportunities to further optimize its service value chain, to add digital components to its product and service offers and to personalize the latter. Similarly, work processes can be simplified and “green” transformations can be advanced in this way. “Innovation and Digitalization” is one of the Group’s strategic action areas; the transformation toward electronically supported processes is fully underway in all business segments.

**Our stated goal:** to be the “most digital” aviation group worldwide. On the following pages we’ll take you along on our flight – destination: digitalization.

# “THE DIGITAL REVOLUTION PERMEATES ALMOST EVERY ASPECT OF AVIATION.”

Dr. Christian Langer

*Head of Digital Strategy, Innovation and Transformation, Lufthansa Group*



## *HOW IMPORTANT IS DIGITALIZATION TO THE LUFTHANSA GROUP?*

It is the central topic related to innovation and future viability in all business segments of the Lufthansa Group. Digitalization is now changing our lives to an extent that only very few were able to imagine a mere ten years ago. Politics and election campaigns today take place on the social media stage in the same matter-of-fact way as do dialogues between friends and strangers. Similarly, learning, doing research and working have changed. Moreover, the digital revolution is permeating almost every aspect of aviation. We are leaders in digital innovations within our industry and would like to maintain this position. This is why Carsten Spohr, our Chairman of the Executive Board and CEO, has proclaimed 2017 as the Year of Digitalization.

## *WHAT ARE THE CHARACTERISTICS OF THE LUFTHANSA GROUP'S DIGITALIZATION STRATEGY?*

We are evaluating all aspects that are related to such a profound process of change. Of course, the central question is how we can offer our customers an even more streamlined and more pleasant travel experience and which opportunities digitalization offers us in this area. Digitalization will change the way we interact with our customers and enable our Group to evolve into a more agile company. The opportunities for increasing efficiency in core processes are also significant and are being assessed in all business segments. Apart from this direct effect on our products and processes it is our goal to be one of the most attractive employers for “digital natives”. What changes do we have to apply to our leadership structures, internal processes and incentive systems to reach this goal? How do we guide our employees and offer them development opportunities towards the new professional areas?

## *WHAT ADVANTAGES WILL CUSTOMERS REAP FROM DIGITAL INNOVATION?*

The airlines within the Lufthansa Group are intensively working on differentiating and personalizing their offers. The goal is as obvious as it is ambitious: We want to increase our customers' satisfaction and thus increase their loyalty. Given that we welcome more than 100 million passengers aboard our aircraft every year, one question takes precedence. How can we take advantage of increasing numbers of customer interactions and use the related stream of information to make even better decisions? Knowing customer preferences is key to personalize and optimize the next step along the customer's travel chain. This is also and especially true for disruptions that may occur during a journey. In this context, it is a central requirement to closely interweave the physical and digital experience with a brand. For example, on the basis of such information we might offer transit passengers lounge access to be able to relax or an upgrade to a higher travel class for the connecting flight.

Incidentally, personalized service improvements along the travel chain contribute to deepening customer relationships and increasing customers' trust. One very important point is that customers will only allow innovative ways of interaction if we offer them attractive advantages and if they trust the integrity applied to handling their personal data. The explicit declaration of consent from all people and organizations with access to such data is a fundamental principle to which the Lufthansa Group is committed in its corporate governance guidelines. Additionally, Germany's stringent data protection laws are applicable.

*HOW CAN AN AVIATION COMPANY TAKE ADVANTAGE OF ELECTRONICALLY SUPPORTED PROCESSES TO OPERATE IN EVEN MORE SUSTAINABLE WAYS?*

From an economic perspective there is significant potential: The question is how digitalization can be harnessed to set up familiar business processes in better and more efficient ways. Specifically, we are looking at efficiency advantages in dimensions that cannot be realized by means of classic methods of continuous improvement such as lean management or kaizen. For example, the use of so-called chatbots in customer service over the telephone – meaning digital assistants supported by artificial intelligence – reduces the workload of our service centers and simultaneously shortens waiting times for our customers. There are also more concrete examples: in the spare parts supply chains for our aircraft we use sensors for geolocalization and tracking systems for aircraft components. Often new technologies provide ecological advantages in addition to economic effects. For example, on its digital platform AVIATAR Lufthansa Technik developed a prognostic system that allows the continuous optimum trimming of the aileron, which in turn significantly reduces kerosene consumption and CO<sub>2</sub> emissions. This is no longer a vision of the future but a solution used in daily operations. Equally, changing from paper-based to digital processes helps us to conserve precious resources along the value chain.

*HOW MUCH INFLUENCE DOES DIGITALIZATION HAVE ON THE LUFTHANSA GROUP'S WORK ENVIRONMENT?*

Our internal structures will change considerably. In the future, working in networks will increasingly gain importance. In contrast to classic hierarchical structures, networks are formed by colleagues who have a particular identification with a topic and would like to make a contribution to it. A person's hierarchical position or the question of organizational affiliation within the Lufthansa Group becomes secondary in this context. Our digital development teams already work in this manner and this highly motivating way of working, which is based on enthusiasm and the will to participate, is set to spread. With the network, a second legitimate organizational element establishes itself in tandem with hierarchy. The network with its ostensibly looser structure fosters searching, experimenting, learning and changing; as a result, a more flexible and agile type of organization will evolve.

## AVIATAR: DIGITAL DEPICTION OF AIRCRAFT AND THE MRO INDUSTRY

With AVIATAR, the new product division Digital Fleet Solutions at Lufthansa Technik headed by Dr. Christian Langer is developing a central, Internet-based platform that offers customers access to all digital MRO solutions (Maintenance, Repair and Overhaul). It allows airlines to monitor the technical state of their fleets in real time and make decisions to ensure optimal technical maintenance. For example, using integrated forecasting systems (predictive maintenance), users are able to search directly for the most suitable spare part and arrange for its shipment to the nearest maintenance station even before the aircraft component in question has malfunctioned. Furthermore, all documents required for proof of airworthiness can be called up directly on AVIATAR. The deliberately open platform invites others – including competitors – to develop innovative applications and offer them there. This new approach aims to significantly increase the development speed of digital innovations for the MRO industry – for the benefit of airlines and passengers alike.

# DIGITAL INNOVATIONS

Explained by Lufthansa Group experts



*BERNHARD BARTH*  
PROCESS ARCHITECT FOR  
THE PAPERLESS MAINTENANCE  
PROGRAM AT LUFTHANSA TECHNIK

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At Lufthansa Technik we set ourselves the goal to digitalize the defects and processing documents related to aircraft maintenance in their entirety. Doing so is set to conserve 27 tonnes of paper a year. The measures we have planned for implementation by the end of 2018 correspond to 5.5 million sheets of paper that will no longer have to be dispatched and archived. In the role of Process Architect for the **Paperless Maintenance Program I** analyze processes in aircraft maintenance and ensure that the digitalization conforms to the original processes. The digital documentation of

maintenance processes saves effort and redundant data entry, and avoids switching between different media. Another advantage: In the future, our technicians will have to deal with a significantly smaller volume of documentation relating to their work on aircraft. Our integrated platform Maintenance Log allows us to process all documents required by our customers both ergonomically and digitally. In this way, data transparency is generated in real time, which in the case of Lufthansa allows active control at an entirely new level.



*HEIKO FREYTAG*  
GROUP MANAGER OF COCKPIT  
INFORMATION SERVICES, WAS THE  
TECHNICAL PROJECT MANAGER  
FOR FLIGHT OPERATIONS IN THE  
eFLIGHTOPS PROJECT

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Within the project eFlightOps, between 2013 and 2016 we developed innovative applications for the Electronic Flight Bag (EFB) at Lufthansa. They support the Group's pilots in preparing and conducting a flight safely and economically. Among the areas of emphasis was the development of the **electronic Flight Folder (eFF)**, a software that displays briefing information in a clear manner for the cockpit crew – for example by displaying particularly important data in graphics and

special colors. The eFF digitalizes processes in the cockpit, from providing the briefing package and fuel order to checks during the flight and archiving tasks. At the same time, the software supports the pilots in determining the quantity of extra fuel, which increases flight safety and promotes a conscientious use of kerosene. In addition, the eFF and the far-reaching avoidance of printed briefing documents reduce paper consumption in the cockpit by about 90 percent.

Innovation

# Efficiency



*THORSTEN FRIEDRICH*  
HEAD OF eFREIGHT GLOBAL  
ROLLOUT AT LUFTHANSA CARGO

Under the umbrella of Lufthansa Cargo's **eFreight** project, we are working on making air freight handling paperless and digitalizing the entire delivery chain by 2020. At the moment, paper documents still have their place in our business. There are airway bills, certificates, customs declarations and insurance documents – everything is printed, sorted, transported and archived. Therefore, we are creating a digital information chain that follows the physical freight shipments. For example, the electronic airway bill (eAWB) has been introduced at more than 150 Lufthansa Cargo stations.

As is already the case for electronic passenger tickets, all data required for cargo shipments will in the future be available digitally and thus in high quality around the clock. The advantage: Our customers no longer have to produce and administer paper documents, while we can work at an early stage with the data transmitted. With eFreight we palpably improve the processes and efficiency of cargo shipments. In addition, digitalization can help conserve about 7,800 tonnes of paper across the industry per year.

# Quality



*MICHAEL ORTWEIN*  
DIRECTOR COMPETENCE CENTER  
OPERATIONAL APPLICATIONS  
AT LSG SKY CHEFS AND CODEVEL-  
OPER OF THE CBASE PROGRAM

Digitalization is improving in-flight catering in many ways. Until recently, our colleagues at LSG Sky Chefs and the crews had to rely on printed loading lists to know how many meals, cutlery sets, amenity kits and blankets are needed for a particular flight. For each flight operated by an Airbus A380 these lists run to about 100 pages. To improve this situation and optimize the loading process, we further developed **CBASE** at the IT department. This program depicts all relevant information concerning in-flight catering. At

the same time, we designed apps based in CBASE, such as the Galley Guide, to ensure that this data is available digitally. In the future, our employees and the crews will be able to find all loading data by means of this app. Additionally, the digital production guide shows them current quantities and pictures of the meals to be loaded. These apps will help us not only to reduce paper consumption, but also to make the entire process smarter. As all information is always current and easy to access, we also prevent possible errors.

# DIGITAL SERVICES

## ALL ALONG THE TRAVEL CHAIN

From planning to arrival



### AT HOME

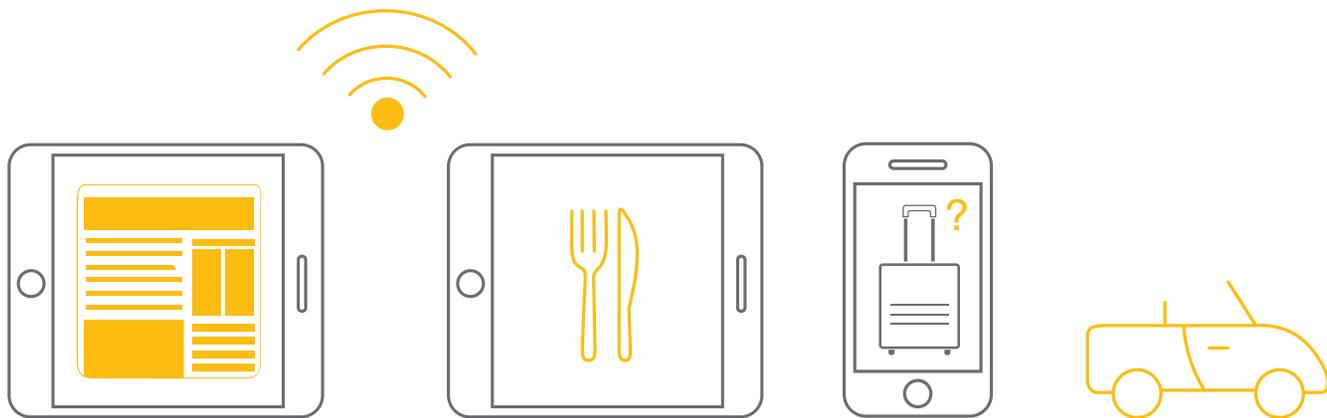
### AIRPORT

**CHATBOT** “Mildred” is the name of the chatbot that has helped Lufthansa Group customers since the end of 2016 to find suitable flights. On request, the virtual contact partner in the Facebook Messenger App finds the best price for flights on the routes operated by Group airlines during the nine months ahead.

**INTIME** “Will I be in time for my flight?” is a question that thousands of passengers ask themselves every day. The new inTime app developed by Lufthansa Systems can answer this question. It calculates how much time a passenger still has to get from his or her current location to the gate punctually. For its forecast, the application takes into consideration the traffic situation around the airport as well as waiting times at check-in and security. Changes, such as a delayed departure, are relayed in real time. The basis for calculations is anonymized passenger data. inTime is adaptive and becomes more intelligent over time. This app is expected to be available to Lufthansa passengers from summer 2017.

**CUSTOMER SERVICE APP** A missed connecting flight, weather-related flight schedule changes, a missing piece of luggage – all of these are cases for Lufthansa Customer Service. But before the latter can solve the problem, the passenger has to provide his or her personal data. A time-consuming and unnecessary effort, which is a thing of the past now, thanks to the new Customer Service app: It combines the personal data from the Lufthansa app with the passenger’s current information and transmits these data to the Customer Service employee. At the same time, the app informs about possible waiting times and opens up new contact options such as call-backs and chats.

**eJOURNALS** The airlines within the Lufthansa Group offer their passengers numerous free eJournals instead of printed newspapers and magazines. Before taking a flight, passengers simply enter their name and reservation code or ticket number online – and they are ready to download their preferred publications to their smartphone, tablet or notebook. The digital media selection featuring more than 250 newspapers and magazines in 18 languages also benefits the environment: eJournals reduce the weight carried on board, which helps cut fuel consumption and CO<sub>2</sub> emissions.



## AIRCRAFT

## DESTINATION

**BOARDCONNECT** Lufthansa Systems continuously works on improving passengers' travel experience by means of personalized solutions and helping airlines position themselves optimally for the digital future. One example for this quest is BoardConnect. This digital platform comes in three versions that provide wireless in-flight entertainment (IFE) on passengers' smartphones and tablets. In addition to the permanently installed classic IFE solution BoardConnect there is also the flexible variant BoardConnect Portable. It combines all technical components in a single unit that can be installed quickly and simply aboard any aircraft without a great deal of cabling. The third option is an Internet-based solution supported by BoardConnect Plus.

**FLYNET** Surfing, chatting, mailing and streaming videos – and all in broadband quality. Lufthansa has offered this service on long-haul flights for many years. Now, passengers on Lufthansa, Austrian Airlines and Eurowings flights can enjoy the same offer by using FlyNet on short- and medium-haul flights when they connect their smartphone, tablet or notebook to the WLAN on board. Lufthansa Group airlines are thus among the first in Europe to offer their passengers this kind of surfing experience. The refit program will be concluded at Lufthansa in 2018.

**ALLERGEN APP** Be it milk, fish, peanuts, or grains containing gluten: Many people suffer from food intolerances. For this reason the LSG Group developed an allergen app based on EU Directive 1169/2011, which covers all relevant information concerning in-flight meals and 14 key allergens. Passengers can thus let the purser know what their food intolerances are and the latter can show them which dishes are suitable for them. The application is available in 16 languages and is tailored precisely to the requirements of the EU Directive, which governs the labeling of foodstuffs (ingredients, information on allergies, expiration dates, etc.).

**DIGITAL BAGGAGE SERVICES** “See you, we’ll be in touch!” is what Lufthansa passengers might have been saying since spring 2016 to their suitcases and bags as they check them in. The airline’s digital baggage services ensure that passengers can use a link on their mobile boarding passes in the Lufthansa app to find out at any time where their checked-in luggage is at that moment. After their arrival at the destination airport the app informs customers when exactly and on which baggage carousel they will receive their luggage. In addition, luggage tags produced with the new solutions “HomeTag” and “Rimowa Electronic Tag” make checking in baggage significantly more comfortable.

# DIGITAL SOLUTIONS

## For the Lufthansa Group's work environments



The Lufthansa Group takes advantage of digitalization not only to continuously improve its product and service offers, but it also counts on digital innovations to optimally support its employees' daily work. This includes eye-tracking technologies that turn employees' eye movements into "control mechanisms"; and augmented reality, the enhancement of reality by means of a virtual, artificial world. Other approaches include the digital interconnectedness of employees, learning apps and virtual reality. To illustrate our many ideas in this area, these two projects are representative:

### OPSession – DIGITALIZATION OF OPERATIONS

OPSession is the name of a program that Lufthansa, SWISS and Austrian Airlines use to digitalize their operative processes on board and on the ground with the aim of aligning flight operations with a more future-oriented perspective. To this end, cabin crews and flight managers will receive mobile devices from 2017 that create new opportunities of working together: Digitally connected employees are able to exchange information more quickly and organize processes more smoothly. The goal of this large-scale digital project is to use current and relevant data to increase efficiency in the area of operations, create new options for employee communications and lift customer service to a new level by offering personalized services. Airlines are especially keen to offer their pilots, pursers and ground employees apps and functions on mobile devices to facilitate their daily work. For example, the "Manage Gates" app continuously provides all current flight information for flight managers.



### VIRTUAL REALITY FOR PILOT TRAINING

Future pilots complete their first cross-country flights under scud running conditions in Phoenix, Arizona. They fly single-engined propeller aircraft on a predefined route, which is divided by waypoints into several route segments. In doing so, they have to pilot the aircraft and navigate at the same time. For the preparation of these first flights, Lufthansa Aviation Training now uses virtual-reality goggles. The VR training module improves the quality and effectiveness of pilot training because the trainee pilots are more quickly able to grasp and penetrate the subject matter by immersing themselves into the virtual environment. By using VR goggles, future pilots are able to familiarize themselves ahead of time in a highly realistic manner with the entire sequence of their first cross-country flight. However, the focal point of the training phase in Phoenix remains aeronautical training.



# “HOW WE SHAPE TOMORROW’S WORLD TODAY IS DECISIVE.”

*Professor Sabine Pfeiffer holds a chair in sociology at Hohenheim University*



## *WHAT INFLUENCE DOES TECHNOLOGICAL PROGRESS HAVE ON THE INTERACTIONS BETWEEN PEOPLE, TECHNOLOGY AND ORGANIZATIONS?*

Technological change has always had a significant influence on people and organizations. What is new is that 4.0 technologies need a lot more shaping. Each company needs to define digitalization in highly concrete terms for itself. As a result, people and organizations now face more pronounced challenges concerning the design of technology than before.

## *WHAT DOES THE WORK ENVIRONMENT 4.0 LOOK LIKE?*

Above all: confused and not simultaneous. Many things will develop in different ways. But the decisive point is how we shape tomorrow’s world today. In shaping the new working environments it is important to create jobs that allow for future changes. The broader the definition of tasks and the more qualified the employees, the greater a company’s ability to innovate in the future.

## *AND TALKING ABOUT INDUSTRY 4.0: WHAT ARE THE REQUIREMENTS THAT EMPLOYEES HAVE TO FULFILL TO BE FIT FOR THE WORLD OF BITS AND BYTES?*

Employees are much fitter than is commonly assumed. One reason for this is that in their private lives they are digitally much more active than on their jobs. Another is that they have gathered experience with change due to digitalization and globalization over the past years. Our research shows that a large number of employees today often deal with change, complexity and imponderables. We measure this requirement with an index concerning the working capacity or “Arbeitsvermögen” in German (AV)<sup>1</sup>. In Germany, 74 percent of employees show an AV value above average; in aviation this value stands at 85 percent and is thus considerably higher. Therefore, the employees know how to deal with change – the important point is to involve them actively from the beginning.

## *HOW CAN COMPANIES BEST SHAPE CORPORATE SUSTAINABILITY IN THE AGE OF DIGITALIZATION?*

Digitalization provides more transparency concerning resource consumption. Smarter management systems for buildings, aviation and IT technology will make it easier to conserve resources. However, these opportunities have to be taken into account at the design stage of such systems. This is highly important because digitalization itself is very resource-intensive.

Sabine Pfeiffer conducts research work on the changes affecting technology and the work environment. One area of emphasis in her work is the question of what effects digitalization has on work situations. In 2016 she was appointed to the scientific advisory council of the platform “Industrie 4.0”.

# SUSTAINABLE BUSINESS PRACTICES



## Strategy and management

All entrepreneurial activities across the Lufthansa Group are guided by awareness of responsible conduct. Applying sustainable management principles with regard to financial, social and ecological aspects is in the interest of the aviation group and its stakeholders. Doing so is a fundamental requirement for further increasing the Company's value over the long-term.

The topic of sustainability is present in all seven action areas of the strategic program "7to1 – Our Way Forward", which aligns the Lufthansa Group with the requirements of the future. Its measures designed to increase efficiency are the basis on which the aviation group is to develop successfully and sustainably. The goal of the strategic program is to increase quality, efficiency and the ability to innovate across the Group and thus to secure the Lufthansa Group's competitiveness (see page 12, Annual Report 2016 and page 19, *Balance* 2016).

The principles of sustainable management are a key element of the Group's governance. To steer the Company, the Lufthansa Group uses a value-oriented management system, which is part of all processes concerning planning, steering and control. This approach aims at creating long-term value independently of industry and business cycles.

The focus of the sustainability strategy is on aspects that have the most significant influence on the Lufthansa Group and where it can

achieve the greatest effect. This includes above all the intention to reduce environmentally relevant effects from business activities on a continuous basis. The Group's measurable contribution in this area comes above all from making comprehensive investments in new aircraft, new technologies and new products.

Moreover, sustainable business practices can also ensure that the Company is able to take advantage of arising opportunities for its own business activities and that risks can be minimized or even avoided, especially those that may result from more stringent regulations, among others. Managing opportunities and risks is integrated into all business processes. The established internal control and risk management systems allow the aviation group to identify risks and their potential effects, and to take appropriate measures (see page 57 ff., Annual Report 2016).

The Lufthansa Group has set itself a comprehensive sustainability agenda, which ensures responsible business practices in all business segments and comprises the dimensions shown below.

### The Corporate Responsibility dimensions of the Lufthansa Group





**THREE QUESTIONS FOR: DR. WILLIAM WILLMS**  
*VICE PRESIDENT GROUP STRATEGY AND M&A*  
*DEUTSCHE LUFTHANSA AG*

**How important is the stakeholder dialogue for the Lufthansa Group?**

We maintain a constant dialogue with our stakeholders, such as shareholders, unions, NGOs, politicians and many more. These continuous and open exchanges help us compare internal objectives with external expectations and demands. Only in this way can we meet our own aspiration of treating more difficult subjects credibly and transparently. The challenge in this context is meeting the multitude of different – and sometimes contradictory – requirements of individual stakeholder groups, and simultaneously positioning the Lufthansa Group according to its mission, vision and strategy in a target-oriented way.

**How is the Lufthansa Group adapting to the EU directive on non-financial reporting, which applies from 2017?**

The Lufthansa Group welcomes the EU-wide directive on non-financial reporting as an important step towards a more pronounced focus on the subject of sustainability. For 23 years, we have informed our stakeholders and the interested public by means of our sustainability report *Balance* about topics, areas of emphasis and progress concerning the Company's sustainable management – not only in the area of ecology, but now also in all dimensions of corporate responsibility. Thus, we already meet most of the requirements that will only be binding from next year as a result of the implementation of the EU directive.

**How will the Lufthansa Group further develop its sustainability strategy?**

I am convinced that sustainability will increasingly become a factor for success in global competition. As a result, stakeholders and management will focus more and more on sustainability strategies. In many Lufthansa Group companies we already have a good setup in this respect. The next step is to continuously evolve Group-wide sustainability strategy and to interlink it even further with Group strategy so that we can give effective Company-wide steering impulses in this area.

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## Organization

The highest control body in the area of sustainable management is the Supervisory Board. The coordination and further development of sustainability-relevant activities and initiatives within the Lufthansa Group is the duty of the Corporate Responsibility Council (CRC). This interdisciplinary and interdepartmental committee is placed at the upper management level and has the task of initiating and coordinating sustainability-related topics and processes at the Group level. The CRC comprises the heads of the Group departments Strategy, Political Affairs, Group Environmental Issues, Human Resources, Legal Affairs, Communications, Investor Relations, Controlling, and Corporate Sourcing. The respective managers are responsible for concrete measures and projects concerning sustainability aspects. They bundle and organize the topics in their own area of responsibility.

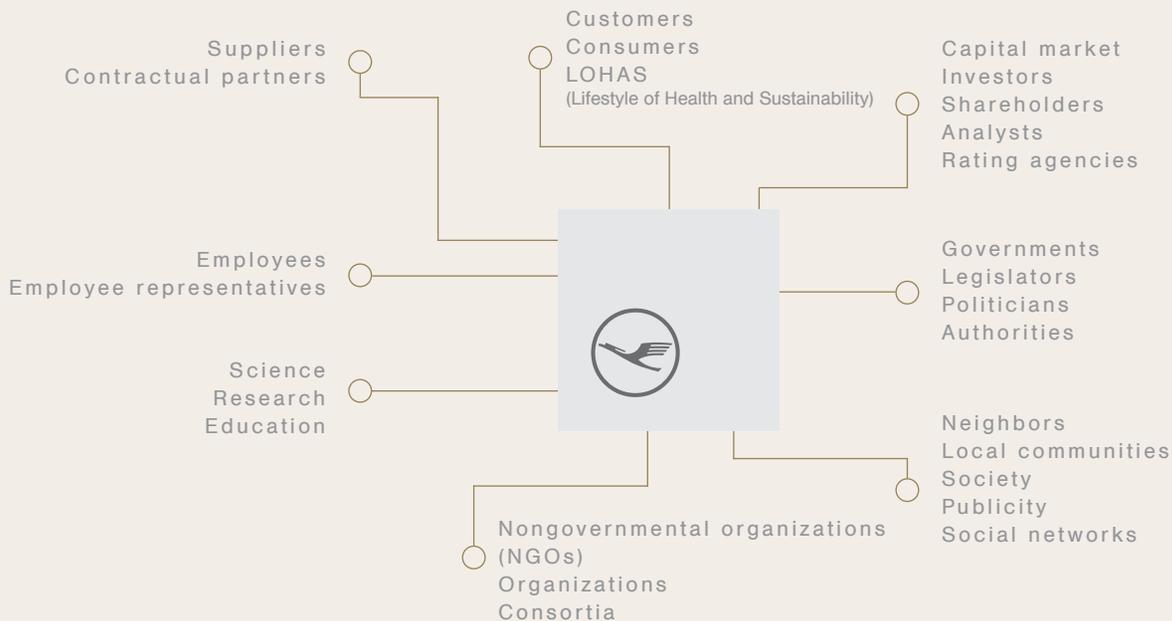
The Lufthansa Group will interlink sustainability aspects even more strongly with Group strategy, aiming to give relevant steering impulses across the Group and track their implementation.

## Stakeholder dialogue

An important contribution for further developing the sustainability agenda as well as the annual reporting on significant topics of corporate responsibility comes from the dialogue with stakeholders. It gives the Lufthansa Group a better understanding of its different interest groups' needs, expectations and wishes, which permits their inclusion in the Company's business practices. Topics with potential influence on long-term opportunities for creating value for the Lufthansa Group can thus be better identified.

The range of stakeholders spans from customers and employees to investors, suppliers, politicians, municipalities, neighbors, NGOs and scientists. The Group places great emphasis on an open, continuous and trusting dialogue with its internal and external stakeholder groups and actively seeks exchanges with them through a range of different dialogue formats (see page 23, Stakeholder dialogue: The most important activities in 2016 at a glance).

## The stakeholders of the Lufthansa Group



## Materiality analysis

The Lufthansa Group conducted a broad stakeholder survey in 2016, which built on earlier reviews (see page 22 f., *Balance* 2016). For this purpose, the Group's experts identified or confirmed 12 relevant action areas. The latter focused on topics

- through which the Lufthansa Group's business activities have a significant social impact,
- which influence stakeholders substantially in their evaluation of the Company,
- which are required by sustainability standards and regulations and
- that have a significant influence on the Lufthansa Group's ability to generate financial and non-financial value over the medium and long term (see page 20 f., *Corporate Responsibility: Action areas and goals*).

Safety and adherence to legal requirements were not included as topics in the survey, as the Lufthansa Group considers these to be basic prerequisites for its business activities. In addition to customers, employees and business partners, stakeholder groups

were invited to participate in the survey that have a particular proximity to the Lufthansa Group due to their professions or their influence in public or political spheres. Their responses are combined with top management's assessments in a materiality matrix (see page 22, *Balance* 2016).

Over the years ahead, this matrix will serve the Lufthansa Group as the base from which to advance the strategic development of corporate responsibility management and for reporting in accordance with legal requirements that are binding for larger, capital-market oriented companies within the European Union from 2017 (see adjacent interview). In addition, the Group used the materiality analysis to determine and adapt the contents of its reporting.

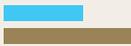
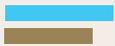
The Lufthansa Group will integrate in particular those action fields that have been defined as "very important" as well as the central aspects related to them even more strongly into its business processes and continue to develop related management approaches. It is also planned to regularly assess the relevance of action areas by means of new materiality analyses and make adjustments if needed.

# Corporate Responsibility (CR): Action areas<sup>1</sup> and goals

CR dimension	Economic Sustainability		Corporate governance and compliance		
<b>Action area</b>	Profitability <sup>2</sup>	Sustainable innovation, research and development	Anti-corruption <sup>2</sup>	Sustainability in the supply chain	Human rights <sup>2</sup>
<b>Effect</b>	internal/external	internal/external	internal/external	external	internal/external
<b>Relevance</b>					
<b>Approach</b>	<ul style="list-style-type: none"> <li>Sustainable corporate management and value-oriented steering of the Group with regard to financial, social and ecological aspects as prerequisites to increase the Company's value long-term</li> </ul>	<ul style="list-style-type: none"> <li>Promotion of an innovation culture within the Lufthansa Group</li> <li>Participation in and support for research initiatives and projects</li> </ul>	<ul style="list-style-type: none"> <li>Strengthening of fair competition, integrity and responsible practices</li> </ul>	<ul style="list-style-type: none"> <li>Securing standards concerning human rights, work conditions and environmental protection in supply chain</li> <li>Applying sustainability criteria in selecting suppliers</li> </ul>	<ul style="list-style-type: none"> <li>Visible positioning as a company that works worldwide for adherence to human rights, among other criteria, as a signatory of the UN Global Compact</li> </ul>
<b>Goals</b>	<ul style="list-style-type: none"> <li>Secure the long-term success and thus the Lufthansa Group's future viability by means of continuous value increases. Goal: to be first choice for customers, shareholders, employees and partners</li> </ul>	<ul style="list-style-type: none"> <li>Strengthen ability to innovate and promote research activities, also with regard to more sustainable products and services</li> </ul>	<ul style="list-style-type: none"> <li>Increase awareness, ensure practices in conformity with law and regulations</li> </ul>	<ul style="list-style-type: none"> <li>Ensure that suppliers guarantee a minimum standard in this area for goods and services supplied to the Lufthansa Group</li> </ul>	<ul style="list-style-type: none"> <li>Adhere to and guarantee human rights</li> <li>Actively defend human rights</li> </ul>
CR dimension	Climate and environmental responsibility			Product responsibility	
<b>Action area</b>	Climate protection	Energy and resource management	Active noise protection	Service and customer orientation	
<b>Effect</b>	external	internal/external	external	external	
<b>Relevance</b>					
<b>Approach</b>	<ul style="list-style-type: none"> <li>Making use of all options provided by the four-pillar strategy to continuously increase fuel efficiency in flight operations and thus to further reduce the specific CO<sub>2</sub> emissions</li> <li>Support for climate research and other scientific projects</li> </ul>	<ul style="list-style-type: none"> <li>Responsible use of natural resources on board and on the ground</li> </ul>	<ul style="list-style-type: none"> <li>Continuous commitment to active noise protection</li> </ul>	<ul style="list-style-type: none"> <li>Orientation in line with customers' wishes and needs, including:                             <ul style="list-style-type: none"> <li>environmentally and socially compatible product and service design</li> <li>appropriate information about environmental and social effects of products and services</li> </ul> </li> </ul>	
<b>Goals</b>	<ul style="list-style-type: none"> <li>Reduce specific fuel consumption of the Lufthansa Group's passenger fleets by 25 percent by 2020, compared with 2006</li> <li>Support IATA goals</li> </ul>	<ul style="list-style-type: none"> <li>Expand continuously, or implement, environmental management systems at Group airlines and service companies</li> </ul>	<ul style="list-style-type: none"> <li>Reduce noise at source long-term, in particular to lessen the burden on people living close to airports</li> </ul>	<ul style="list-style-type: none"> <li>At least maintain – or increase – customer satisfaction and NPS®, depending on concrete objectives</li> <li>Identify and implement approaches to increase customer orientation</li> </ul>	

Relevance for the Lufthansa Group from "important" to "very important"

Relevance for stakeholders from "important" to "very important"

CR dimension	Social responsibility		
<b>Action area</b>	<b>Employer attractiveness</b> internal/external	<b>Job safety and health protection</b> internal	<b>Employee awareness about sustainability</b> internal
<b>Effect</b>			
<b>Relevance</b>			
<b>Approach</b>	<ul style="list-style-type: none"> <li>• Fair and partnership-oriented relationship with employees</li> <li>• Comprehensive approach to promoting greater diversity in all dimensions</li> <li>• Maintaining a balanced relationship between working and private life</li> <li>• Offer of broad portfolio of training and continuing education options</li> <li>• High social standards</li> </ul>	<ul style="list-style-type: none"> <li>• Health-promoting design of work environments, work processes and cooperation</li> <li>• Support for employees in assuming responsibility for their health</li> </ul>	<ul style="list-style-type: none"> <li>• Sensitization of all employees concerning the importance of an environmentally and socially compatible company, for example by training, web-based training and internal communications</li> </ul>
<b>Goals</b>	<ul style="list-style-type: none"> <li>• Position all Lufthansa Group companies as attractive employers</li> <li>• Find and keep qualified personnel, also by means of talent management</li> <li>• Improve the Engagement Index</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain employees' health and ability to perform long-term and sustainably</li> <li>• Promote individual responsibility: sensitize employees to actively look after their health</li> </ul>	<ul style="list-style-type: none"> <li>• Increase employees' awareness of responsible and sustainable business practices</li> </ul>
<b>CR dimension</b>	Society		
<b>Action area</b>	<b>Local value creation</b>	<b>Corporate citizenship</b>	<b>Transparent political commitment</b>
<b>Effect</b>	external	internal/external	external
<b>Relevance</b>			
<b>Approach</b>	<ul style="list-style-type: none"> <li>• Airport operators, local service providers and suppliers particularly benefit from output sourced locally by airlines</li> </ul>	<ul style="list-style-type: none"> <li>• Focused corporate citizenship concept</li> <li>• Providing humanitarian emergency aid and support in the event of catastrophes</li> </ul>	<ul style="list-style-type: none"> <li>• Transparent and open advocacy of the Company's or industry's interests at the political level</li> </ul>
<b>Goals</b>	<ul style="list-style-type: none"> <li>• Support economic development at regional level and make contribution in context of social commitment</li> </ul>	<ul style="list-style-type: none"> <li>• Expand social commitment and increase efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure transparency with regard to the Lufthansa Group's political commitment</li> </ul>

1 The action areas were identified and evaluated in 2016 in the context of a broadly designed stakeholder survey (see page 22 f., *Balance* 2016).

2 The subject areas economic sustainability, anti-corruption and human rights were not

included in the 2016 stakeholder survey as they are defined for the Lufthansa Group in the principles of sustainable corporate governance, as are the subjects of safety and compliance with legal frameworks.

## Committed to the United Nations' sustainability goals

In September 2015, the United Nations' member countries adopted the Agenda 2030 for sustainability; its central element is the 17 global Sustainable Development Goals (SDGs, see [www.un.org/sustainabledevelopment](http://www.un.org/sustainabledevelopment)). As a company with global activities and the first signatory of the UN Global Compact from the ranks of the aviation industry, the Lufthansa Group feels particularly bound by these guidelines. They are the basis of our business activities and part of the Group's strategic positioning as well as that of its individual subsidiaries. In the same way, the SDGs are reflected in the Lufthansa Group's significant action fields. Of particular relevance are the climate goals, the responsible use of resources, adherence to social and ecological compatibility of innovation and digitalization projects, the promotion of female employees in management positions and the improvement of working conditions. Additionally, the Lufthansa Group is particularly committed to the areas of education and enabling through the help alliance, its charitable organization.

## Diversity Charter and initiative "A matter for the boss"

The Lufthansa Group places great emphasis on diversity within the Company. For this reason, the Group is a signatory to the Diversity Charter, among other such initiatives. The goal of this initiative is to advance the acceptance, appreciation and inclusion of diversity in German companies and institutions. Since June 2016 the aviation company has also been committed to the initiative "A matter for the boss" (see page 65, Diversity and equal opportunities).

## Founding member of BDL and A4E

The Lufthansa Group is a founding member of the German Aviation Association (BDL), which has represented the interests of Germany's aviation industry with a single voice since December 2010. Furthermore, the Company is among the founding members of Airlines for Europe (A4E). This association was founded at the beginning of 2016 and represents the concerns of European airlines and their passengers. Carsten Spohr, the Chairman of the Executive Board and CEO of Deutsche Lufthansa AG, assumed the A4E's presidency in February 2017.

In 2016, the Lufthansa Group and Munich Airport jointly hosted the CDP DACH Climate Leadership Award Conference.



## Awards and ratings

Sustainability analysts and rating agencies regularly evaluate the Lufthansa Group's activities according to the criteria of responsible corporate management. In 2016, the Lufthansa share was again represented in the sustainability indices MSCI Global Sustainability, FTSE4Good and ECPI (see page 9, Annual Report 2016).

The Lufthansa Group has participated in the annual CDP reporting since 2006. Every year, this nonprofit organization conducts the largest climate ranking worldwide, for which companies provide comprehensive information and data concerning CO<sub>2</sub> emissions, reduction strategies and climate risks on a voluntary basis. In this way, the aviation company informs capital markets and other stakeholder groups in a transparent manner about its climate protection strategy, programs and measures to reduce CO<sub>2</sub> emissions. With a climate scoring result of "B" in the CDP Climate Change Report 2016, the Group achieved the status of "Sector Leader Transportation" in the DACH region and thus ranks among the best in the industry in Germany, Austria and Switzerland. In 2016, the Lufthansa Group and Munich Airport jointly hosted the CDP DACH Climate Leadership Award Conference, whose motto was "Climate protection in civil aviation".

Further information on prizes and awards that the Lufthansa Group and its subsidiary companies have received in the context of corporate responsibility is shown on page 103.

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## STAKEHOLDER DIALOGUE: THE MOST IMPORTANT ACTIVITIES IN 2016 AT A GLANCE

### Customers

- Customer surveys on a global basis
- Regular ascertainment of Net Promoter Score (NPS®), see page 54)
- Monthly customer in-flight magazines and regular newsletters
- Lufthansa InTouch Service Centers ensure 24-hour reachability concerning all questions on flight reservations
- New format “Lufthansa Flying Lab”: Passengers can experience innovative services on board “live” on selected flights, test them and provide feedback
- Visitor service “Discover Lufthansa” assumes important function of customer care at largest location, Frankfurt. Made-to-measure programs for German and international top customers as well as airport neighbors, associations, research institutions and partner universities of the Lufthansa Group

### Employees

- Group-wide employee survey “involve me!” (Quick Check, see page 69)
- Realignment of internal Group media: With the product group “One” a new media architecture was developed for the Lufthansa Group and implemented at the beginning of 2016. This includes the monthly magazine “One”, the news app “One”, “eBase One” (news portal on the intranet) and “Connection One” (community on social intranet)
- Introduction of “Yammer” as a social media tool at Austrian Airlines
- Continuation of the dialogue forums for cabin and cockpit employees
- New format “CabCon”: dialogue events for flight attendants at Lufthansa
- Continuation of the dialogue series “Speaking openly...” with the Lufthansa Group’s CEO at varying Company locations and live transmission on the intranet
- Continuation of the dialogue series “Breakfast with the Executive Board” in different business segments
- Live chats and dialogue events for different employee groups and managers
- Continuation of the event format “Market conferences”: dialogue events with managers and the Lufthansa Group’s CEO in different business regions (2016 in Nairobi, Panama and Tokyo)
- New format “Alumni Network”: It offers former employees the option of staying in contact with the Lufthansa Group (see page 71)

### Shareholders, investors and analysts

- Continuous and intensive shareholder dialogue
- Beyond the quarterly conferences, Executive Board members and Investor Relations presented the Group’s latest developments to institutional investors through 38 roadshows and 21 investors’ conferences as well as one “Expert Session” on the subject of Eurowings

- Four forums specifically aimed at retail investors
- Again two issues published of Shareholder information letter for private shareholders
- In addition to annual and interim reports, the capital markets are informed monthly about the latest traffic developments at the flying companies of the Lufthansa Group
- All publications, financial reports, presentations, background information and speeches, current news and relevant dates can be consulted at [www.lufthansagroup.com/investor-relations](http://www.lufthansagroup.com/investor-relations)
- In 2016, the Lufthansa Group and Munich Airport were joint hosts of the CDP DACH Climate Leadership Award Conference. The event’s emphasis was “climate protection in air transport”

### Lawmakers and public administrations

- Continuous and intensive exchanges with representatives from politics and administrations as well as participation in numerous events and panel discussions
- “Policy Brief” and “Aeropolitics” are published by the Lufthansa Group and SWISS respectively to inform decision-makers in politics, media and business about developments in the aviation industry and topics related to aviation policy

### Science and research

- Numerous cooperations with scientific research institutions
- Participation in panel discussions and conferences, such as the 4th International Conference on Active Noise Abatement ICANA 2016 in Frankfurt
- Participation in aviation cluster “Hamburg Aviation” to promote business location and interlinked research as well as development of high-quality products and services

### Neighbors and local communities

- Regular information events and discussion round-tables with representatives of state and municipal governments at the Lufthansa Group’s hubs
- Participation in the “Forum Airport and Region” in Frankfurt as well as in the “Vienna Airport Dialogue Forum”
- Since May 2015, LSG Sky Chefs has been a member of “LEEN 100” (Learning Energy Efficiency Network) initiated by the city of Frankfurt for improved CO<sub>2</sub> values in the Rhein-Main area
- Lufthansa CityLine has been a member of the fifth “Environmental Pact Bavaria” since September 2015. Its goal is to give incentives to sustainable development and continuous improvement of corporate environmental protection in Bavaria
- Participation of Lufthansa Technik and LZ-Catering in “Environmental Partnership Hamburg” and of Lufthansa Technik in Frankfurt in “Environmental Alliance Hesse”

## Ethics and integrity

Ethics and integrity are significant components of entrepreneurial practice at the Lufthansa Group. It is a matter of fact for the Group to adhere to current laws and voluntary commitments, and to consciously respect ethical principles. An important consideration is that business conduct characterized by integrity is a key prerequisite for the Company's long-term success.

The Lufthansa Group takes its orientation from the United Nations' Global Compact (see page 26) in particular, but also from the United Nations' Universal Declaration of Human Rights and the four core work standards of the International Labor Organization (ILO). Suppliers must take these standards and principles into account as much as the Group's environmental guidelines.

The Lufthansa Group pays particular attention to realizing exemplary company management in the sense of effective corporate governance. It expresses this approach by means of company management and control aligned with responsible and sustainable methods of increasing the Company's value. This approach to management meets high international standards and is of central importance to maintain transparency in the relationship with shareholders and to increase trust in the Company's management on a continuous basis.

Significant foundations in this respect are the German Stock Corporation Act and the German Corporate Governance Code. The compliance declaration concerning the German Corporate Governance Code, which was updated in December 2016, has been published on the Internet at [www.lufthansagroup.com/investor-relations](https://www.lufthansagroup.com/investor-relations). In addition, the Lufthansa Group is listed in the joint transparency register of the European Commission and the European Parliament. The goal of this register with public access is to increase the transparency of decision-making processes on a voluntary basis. Simultaneously, it aims at ensuring that interactions between EU institutions and organizations, associations and corporations are conducted in conformity with current laws and carried out on the basis of ethical principles.

## Compliance and anti-corruption

Compliance describes all measures that ensure the lawful conduct of companies, their executive bodies and employees. The Lufthansa Group Compliance Program, established in 2004, aims at helping its employees adhere to current legal norms and keeping them from breaking the law. During the reporting year it comprised the modules Competition, Integrity, Capital Market and Embargo Compliance.

### Group Compliance Office

The Group-wide implementation, development and communication of the Lufthansa Group Compliance Program is the responsibility of the Group Compliance Office, which is part of the central Legal Department. It is supported by a worldwide network of compliance managers at the Group companies.

Furthermore, the Group Compliance Office advises Lufthansa Group employees worldwide on how to handle issues related to integrity, competition, embargo and capital market compliance. The Company's internal Compliance Guidelines provide the basis for such consultations. These regulations give employees a binding framework for action to ensure standardized and law-abiding conduct across the Group. The Lufthansa Group is not willing to tolerate violations of law on the part of its employees. The Group Compliance Office coordinates the investigation of circumstances relevant to compliance and in this context serves as a contact point for cartel and investigative authorities, with whom the Lufthansa Group cooperates without reservation. Culpable breaches of law lead to consequences under labor law and may also entail personal liability.

**Competition Compliance**

The module Competition Compliance introduces employees to the relevant regulations of competition and cartel legislation, so as to minimize or exclude risks for the Lufthansa Group. All employees handling issues relevant to competition or cartels are trained in the fundamental regulations of German and European antitrust legislation.

**Integrity Compliance**

With the module Integrity Compliance, the Lufthansa Group documents its fundamental approach of law-abiding conduct in business relationships. The obligation to adhere to non-corrupt and ethically correct conduct flow naturally from current law, the internal Compliance Guidelines and self-set obligations related to the Group's memberships in relevant national and international organizations. Examples of the latter include the Lufthansa Group's commitment to the principles of the UN Global Compact and its membership in Transparency International. The Integrity Compliance Guidelines provide support in handling invitations, gifts and other attentions.

**Capital Market Compliance**

The module Capital Market Compliance gives employees an overview of current capital market law, such as regulations relating to insider trading or ad hoc publicity. Accompanied by specialized training, this module ensures that all employees and Company bodies concerned receive in-depth insight into the regulations of the German Securities Trading Act (WpHG).

**Embargo Compliance**

The module Embargo Compliance serves to ensure that the Lufthansa Group, as a globally active corporation, adheres to country- and person-specific sanctions and regulations in the area of foreign trade. The Embargo Compliance Guidelines provide the employees concerned with a binding framework of conduct.

**Compliance training**

Automated IT processes ensure that all employees participate regularly in those web-based compliance trainings that are relevant for them. The employees of the subsidiary companies also have access to these e-Learning courses and are either included in automatic mailings of materials or have their own company-specific processes. In addition, the Group Compliance Office conducts trainings with personal participation worldwide and offers workshops. In 2016, about 20,000 employees worldwide completed the eCompliance trainings and/or trainings with personal participation relevant for them.

**Third-party due diligence processes**

The Lufthansa Group expects compliance from its business partners as well. Based on risk, business partners are therefore screened by means of third-party due diligence processes before the beginning of a business relationship. The appropriate processes are currently rolled out Group-wide.

**Monitoring and reporting**

In keeping with current requirements in the framework of the German Accounting Law Modernization Act, self-audits and external audits take place to evaluate the effective implementation of the Compliance Program. Furthermore, the Supervisory Board's Audit Committee is informed twice a year about current developments relevant to compliance issues within the Group.

## The Compliance Program of the Lufthansa Group



Competition



Integrity



Capital Market



Embargo

Program consisting of four modules

The Group Compliance Office is responsible for implementation, development and communication.

## The 10 principles of the UN Global Compact

The UN Global Compact is the largest initiative worldwide for responsible and sustainable corporate management. In 2002 Deutsche Lufthansa AG was the first aviation group to join this pact between the United Nations and corporations. The goal of the initiative, which was launched two years earlier, is to make globalization socially and environmentally compatible. The participating companies commit themselves to aligning their business activities and strategies with ten principles that are recognized around the world. These include: to respect human rights, to maintain minimum standards and to fight against corruption.

### Human rights

- Businesses should support and respect the protection of international human rights within their sphere of influence and
- make sure their own corporations are not indirectly linked to human rights abuses.

### Labor

- Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;
- eliminate all forms of forced and compulsory labor;
- effectively abolish child labor; and
- eliminate any discrimination in respect of employment and occupation.

### Environment

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

### Anti-corruption

- Businesses should work against corruption in all forms, including extortion and bribery.

 [www.unglobalcompact.org](http://www.unglobalcompact.org)

### Ombudsman system

A further basic component of the Lufthansa Compliance Program is the globally implemented and proven ombudsman system, which also allows anonymous information concerning possible breaches of compliance. It serves as an additional preventive measure against economic crimes. Relevant information can be given by employees or by third parties to an ombudsman outside the Company, by telephone, in writing or in person. The ombudsman function is fulfilled by Frankfurt-based lawyer Dr. Rainer Buchert, who is fully bound by the professional obligation of secrecy and also has the legal right to refuse to give evidence to public investigative authorities. The ombudsman communicates any information he receives to Lufthansa while respecting absolute confidentiality concerning the name and identity of the informant. In this way, the disclosure of an informant's identity to Lufthansa or to third parties without his or her consent is ruled out.

### Compliance Risk Assessment

On behalf of the Executive Board, the Group Compliance Office has conducted a worldwide Compliance Risk Assessment (CRA) for the Lufthansa Group since the beginning of 2016. The goal is to improve the Group's Compliance Management System over the long-term by aligning it with compliance risks. Emphasis is placed on the identification and evaluation of risks to which the Lufthansa Group is exposed with regard to the compliance modules Integrity and Competition. Selected items of information are also being gathered for the compliance modules Embargo and Money-laundering.

The CRA covers all companies, business segments and units. For the ultimate holding companies and particularly risk-prone Group companies, risks are determined on the basis of workshops. All other companies or majority-held companies are assessed by the compliance experts by means of questionnaires. At the end of 2016, the CRA for the Lufthansa Group was 60 percent complete. All companies, business segments and units are to be audited accordingly in the course of 2017.

## Human rights

The Lufthansa Group is a member of the UN Global Compact, Transparency International, the German Network for Business Ethics and of institutions that support individual aspects of human rights. In this way, the Group explicitly acknowledges its adherence to the respective standards and, implicitly, its respect for human rights.

During the reporting year, the Lufthansa Group worked intensively on the topic of human rights. One task was the development of a risk map for the Group that shows the number of employees by geographic region and the companies active locally. Complemented by risk assessment during the financial year 2017, this map is to serve as the basis for reevaluating existing processes and concepts. In the event of complaints concerning human rights issues, these are taken up in a decentralized format and treated with appropriate countermeasures on the basis of current law.

## Sustainability in the purchasing processes

The Lufthansa Group has more than 40,000 suppliers. The annual purchasing volume is about 17 billion euros. The aviation group demands of its suppliers that they fully comply with current law, guidelines and regulations concerning fair competition, integrity and responsible practices.

Currently, the Lufthansa Group is working on realigning the purchasing function, consisting of the Group companies' purchasing departments and the Group department Corporate Sourcing, by merchandise groups and transferring it into a matrix organization. The restructuring was started in 2016 and serves to increase efficiency, lower costs long-term and prevent risks in the supply chain even more effectively. There are also plans to anchor the topic of sustainability even more profoundly in the supply chain. For this purpose, nonfinancial ratios are to be developed to be able to better measure sustainability-relevant aspects in the procurement process.

### Group Purchasing Guideline

The Group Purchasing Guideline obliges suppliers to commit themselves to social and ecological responsibility. It is to be understood as an overriding specification for all procurement guidelines at the Group companies. In addition, it serves as a handbook for buyers and all employees with contacts to the procurement markets. The regulations are updated and adapted continuously. Among other considerations, it requires that these obligations be included in contracts with suppliers:

- Suppliers must comply with the ten principles of the UN Global Compact just as much as the Lufthansa Group (see adjacent overview).
- They must comply with the four core work standards of the International Labor Organization (ILO). These concern freedom of association, the right to collective bargaining, the elimination of forced labor and child labor, and prohibition of discrimination in respect of employment and occupation.
- They must consent to announced and unannounced audits by companies of the Lufthansa Group.
- They must recognize the Lufthansa Group's right to terminate the contractual relationship in the event of a breach of the aforementioned agreements. Suppliers must also observe the Lufthansa Group's Environmental Protection Guidelines.

By stipulating these commitments, the Lufthansa Group ensures that sustainability is taken seriously as an issue and that it becomes a way of life all across the supply chain. The aviation group trains its purchasers at the Procurement Academy, its continuing education program across business segments.



## LUFTHANSA CARGO

The certified environmental management system operated by Lufthansa Cargo comprises internal and external audits at stations in Germany and abroad. During these checks, auditors also assess how the logistics partner ensures that they adhere to local environmental laws and implement Lufthansa Cargo's environmental standards. In addition, the air freight specialist has agreed high standards in the contracts with its road feeder service partners who deliver air freight by truck within Europe, including consideration of the emissions norms of the trucks used for these services. Lufthansa Cargo carries out regular audits to check on whether the partner companies meet these requirements.

## Fleet development

The Lufthansa Group counts on a modern, efficient and appropriately structured fleet and continues to invest in the latter's fundamental modernization. By following this approach, the aviation group will be able to offer leading-edge product quality in the future and at the same time fly increasingly economically and quietly. In addition, unit costs can be further reduced.

In 2016, the Lufthansa Group consistently continued the largest fleet modernization program in its history and integrated a state-of-the-art fuel-efficient aircraft into the Group fleet almost every week. Altogether, the Company took delivery of 47 new aircraft during the reporting year, including eight long-haul aircraft. At the end of 2016, the Lufthansa Group fleet comprised 617 aircraft. With an average age of 11.3 years it is younger than it was in the preceding year (see table page 31).

At the end of 2016, a total of 205 aircraft – 143 short-haul and 62 long-haul aircraft – with a value of 35 billion euros at list prices were on the Group's order sheet; these are to be delivered step-by-step by 2025. During the financial year 2017, the Lufthansa Group expects to take delivery of up to 38 new aircraft.

The fleet modernization also serves the purpose of maintaining the Lufthansa Group's high level of financial and operative flexibility. The majority of aircraft is to remain financially unencumbered in the future and in the unrestricted ownership of the Group. For additional acquisitions the Lufthansa Group strikes a balance between new and used aircraft. In this way, the Company is able to react flexibly to demand fluctuations and increase or reduce capacity at short notice.

### Forward-looking fleet management

At the Lufthansa Group, Fleet Management steers the Group-wide fleet planning process and is thus responsible for the fleet's size and composition, and assignments of aircraft to individual flying companies. The newly introduced matrix structure ensures that the Company optimally bundles the technical knowledge available in the Group airlines. On the basis of market analyses and defined parameters, experts select a type of aircraft and determine the number to be ordered. The process from deciding on a particular

type of aircraft to taking delivery takes about three to five years. At the same time, Fleet Management calculates the optimum point in time for deploying an aircraft, which increases planning security for distribution, network planning and technical services.

Today, the Group's network airlines essentially grow when older aircraft are replaced by modern models with larger seat capacities and improved fuel efficiency – without a significant increase in the total number of aircraft. At the same time, the Lufthansa Group's fleet strategy has for some years aimed at reducing the number of aircraft types, so that the harmonization of the fleet structure advances more and more: The majority of aircraft is now manufactured by Airbus and Boeing. In addition, aircraft produced by manufacturers Bombardier, Embraer, Fokker and BAE Systems are operated on short- and medium-haul routes. The number of different aircraft types will be further reduced over the years ahead, so that complexity will decline and efficiency increase. Fleet harmonization helps reduce maintenance and acquisition costs, and increase synergies, from pilot and cabin crew licensing to more standardized processes on board and stocking spare parts. After leaving the fleet, aircraft are either sold or recycled (see page 56, *Balance 2016*).

An overview of the Group airlines' fleet development:

### Lufthansa

In January 2016, Lufthansa became the first customer worldwide to receive the Airbus A320neo. The airline took delivery of five aircraft of this type during the reporting year, which flies in a new dimension of sustainability: The A320neo is more than 15 percent more fuel-efficient than comparable predecessor models and is characterized by correspondingly lower CO<sub>2</sub> emissions (see page 30 f., *Balance 2016*). Furthermore, the 85-decibel noise footprint of an

A320neo taking off is only about half as large as the comparable contour of an A320 in the existing fleet (see page 58, *Balance* 2016). Thanks to new engine technology and an advanced cabin interior with up to 180 seats, the A320neo is about 20 percent more cost effective. According to current plans, Airbus is to deliver five further A320neo aircraft to Lufthansa in 2017.

For all continental routes Lufthansa now relies on a fleet that only comprises aircraft from the A320 family; on December 31, 2016 it consisted of 167 aircraft of types A319, A320 and A321. The airline operated its remaining Boeing 737-300s for the last time on October 29, 2016 in scheduled operations. Their decommissioning brought an era spanning almost 50 years to an end at Lufthansa.

Furthermore, at the end of 2016 the airline received its first Airbus A350-900, which is considered the world's most modern and environmentally friendly long-haul aircraft. The A350-900 consumes 25 percent less kerosene and produces 25 percent less CO<sub>2</sub> emissions (see illustration below). It consists of up to 70 percent high-tech materials such as composites, titanium and aluminum alloys. The combination of these materials increases corrosion resistance and reduces the aircraft's weight, which has a positive effect on fuel consumption. Thanks to its advanced engines and weight reductions, an A350-900 taking off is considerably quieter than comparable types of aircraft. Its noise emissions are far below required threshold values.

## The Airbus A350-900: A new dimension of flying



In 2016, Lufthansa became the first airline worldwide to start operations with the Airbus A320neo.



The Airbus A350-900 is considered the world's most modern and environmentally friendly long-haul aircraft.



The A350-900 sets new standards not only in sustainability, but also concerning passenger experience and technical equipment. Lufthansa will station a total of 15 of these aircraft at its Munich hub, of which the first three started scheduled operations in spring 2017. Given its capacity and efficiency, this type of aircraft is ideal for a hub like Munich, where it replaces the Airbus A340-600. In direct comparison, the A350-900 conserves 13.7 million liters per year on the Munich – Boston – Munich route. With the kerosene saved, the A350-900 can fly 133 return trips between Munich and Boston.

World premiere:  
SWISS received the first CS100 aircraft in 2016.



## SWISS

In 2016, SWISS replaced six Airbus A340-300 long-haul aircraft with the Boeing 777-300ER. Another four B777-300ERs are to be integrated into the fleet by the end of 2018; two of them in 2017. Thus, the airline complemented its original order of nine B777-300ERs in 2016 with one additional aircraft of this type. SWISS will equip the five A340-300s remaining in the fleet with an entirely new cabin product. One A340-300 was taken over by Edelweiss Air as a rollover for an A330-200 and put into service in December 2016.

On short- and medium-haul routes SWISS became the first airline worldwide to operate the new C Series by Bombardier and phased in the first five CS100s in 2016. This aircraft is specifically designed for small markets and sets a new standard with regard to efficiency, environmental compatibility and comfort. Compared with the predecessor model, the Avro RJ100, perceptible noise is significantly reduced. In addition, CO<sub>2</sub> emissions are 20 percent lower. SWISS has a total of 30 C Series aircraft on order, whose integration into the fleet is to be completed by the end of 2018.



An Embraer 195 operated by Austrian Airlines



## Austrian Airlines

In 2016, Austrian Airlines continued the replacement of its Fokker fleet, which began the previous year, with modern Embraer 195 medium-haul aircraft. By the end of 2016, the airline had added ten Embraers to its fleet. Another seven aircraft are on order and set to follow by the end of 2017. In addition, Austrian Airlines integrated two Airbus A320s from Lufthansa in its fleet during the reporting year.

## Eurowings

The last CRJ900 left the Eurowings fleet in February 2017 and the airline now operates a homogeneous A320 fleet. This fleet harmonization strengthens the Eurowings concept, which is based on high efficiency, competitive costs and a scalable company structure. This allows the airline the flexible integration of new partners with different cooperation models. To this end, by the end of 2016 Eurowings took delivery of a total of 33 Airbus A319 and A320 aircraft from Air Berlin under a wet-lease agreement, meaning complete with cockpit crews, cabin personnel and maintenance contracts. In 2017, the Eurowings fleet will continue to grow due to the consolidation of Brussels Airlines.

## Lufthansa Cargo

At the end of 2016, Lufthansa Cargo had five Boeing 777F freighter aircraft in operation. This type is considered the quietest and most fuel-efficient freighter in its class and is characterized by its high level of reliability and long range. The fleet also includes 14 Boeing MD-11Fs, of which two will remain on the ground for the time being, given the difficult economic environment.

## The Lufthansa Group fleet

As of December 31, 2016 (changes compared to 2015)

	In possession <sup>1</sup>		Age <sup>1</sup>		In operation <sup>2</sup>		Age <sup>2</sup>	
Lufthansa (including regional partners)	350	(-26)	10.1	(-0.5)	330	(+7)	10.2	(±0)
Eurowings (including Germanwings)	78	(+40)	11.3	(+2.5)	96	(+9)	10.6	(+0.2)
SWISS (including Edelweiss Air)	89	(+1)	12.3	(-1.7)	89	(+1)	12.3	(-1.7)
Austrian Airlines	81	(+2)	14.9	(-1.2)	81	(+3)	14.9	(-1.2)
Lufthansa Cargo	19	(±0)	13.5	(+1.0)	17	(-2)	13.1	(+0.7)
<b>Lufthansa Group fleet</b>	<b>617</b>	<b>(+17)</b>	<b>11.3</b>	<b>(-0.5)</b>	<b>613</b>	<b>(+18)</b>	<b>11.3</b>	<b>(-0.4)</b>

<sup>1</sup> Aircraft in the Group's possession

<sup>2</sup> Aircraft operated by the Group

# CLIMATE AND ENVIRONMENTAL RESPONSIBILITY



## Strategy and management

On a global scale, aviation is a growth industry and will need fossil fuels for an undetermined period of time. Among the significant effects of flight operations are above all climate effects as a result of CO<sub>2</sub> emissions. However, for many years the industry has improved its energy efficiency and thus also its CO<sub>2</sub> balance sheet: Despite marked growth rates, the share of aviation in world-wide CO<sub>2</sub> emissions has declined, namely from 2.81 percent in 2000 to 2.55 percent in 2014<sup>1</sup>.

Apart from the climate-related effects, there are other environmental burdens: During takeoff and landing, aircraft cause noise close to airports and have an influence on local air quality. In addition, upstream and downstream activities consume resources such as energy and water, and produce waste materials, in particular in airline catering and aircraft maintenance.

Given this framework of conditions, assuming responsibility for climatic and environmental issues is a central concern for the Lufthansa Group. Guided by the aspect of materiality, the Company focuses its commitment above all on the “product of flying” and therefore on CO<sub>2</sub> emissions and aircraft noise. The Group has set itself the goal of increasingly limiting the environmental effects of flying. The primary objective is to meet rising mobility needs with environmentally competitive products and to continually raise ecological efficiency in flight operations. This approach is guided by the Group’s environmental strategy 2020, which was adopted in 2008.

Concretely, the Lufthansa Group aims at reaching the objective of improving its fuel efficiency by 25 percent from 2006 to 2020; at the end of 2016, it had realized 12.18 percent of this goal. Simultaneously, the Company supports the ambitious climate protection goals formulated by the international aviation industry. This includes improving fuel efficiency by 1.5 percent per year until 2020 and to realize transport growth after this date in CO<sub>2</sub> neutral ways. By 2050 the industry’s net CO<sub>2</sub> emissions are to decline by 50 percent on the basis of 2005.

### Risk management and organizational structures

The entrepreneurial risks associated with climate change and noise tie the Lufthansa Group into a multidisciplinary, Company-wide risk management process. These risks are also summarized in a risk chart, which is updated regularly. To steer opportunities and risks associated with the environment, the Group has developed a range of mechanisms. They include the environmental strategy 2020, environmental programs and environmental management systems, among others (see page 35).

The department Group Environmental Issues is responsible for the Lufthansa Group’s definition, coordination and implementation of Company-wide strategies and measures with environmental relevance. It also acts as the interface with the Executive Board. In addition, all larger subsidiaries have their own environmental departments, an environmental commissioner or coordinator. These experts meet twice a year at the Group-wide Environmental Forum to discuss current topics, exchange experiences and develop new ideas. They also explain and prioritize risks and opportunities from different perspectives. In addition, the Lufthansa Group maintains a comprehensive environmental database where information from Group companies is gathered. This data is the basis for calculating ratios and key indicators.

<sup>1</sup> Source: <http://data.iea.org>



**THREE QUESTIONS FOR: DR. KARLHEINZ HAAG**  
*VICE PRESIDENT GROUP ENVIRONMENTAL ISSUES*  
*DEUTSCHE LUFTHANSA AG*

**What did the aviation industry accomplish in 2016 in the area of climate protection?**

In October 2016 the International Civil Aviation Organization (ICAO) adopted a global CO<sub>2</sub> control system. This treaty, named CORSIA, is part of a comprehensive package of measures and ensures that growth in international air transport will be achieved CO<sub>2</sub> neutrally from 2021. From that time, airlines will have to buy compensation certificates for growth-related CO<sub>2</sub> emissions. The Lufthansa Group welcomes CORSIA and together with the entire aviation industry we have advocated global regulations for many years. Even though CORSIA is a compromise, it is currently the best possible solution. Thus, a framework of conditions has been defined that will allow the effective development and implementation of this resolution in the years ahead. We specifically support this process.

**What does CORSIA mean for the EU Emissions Trading Scheme for aviation?**

In the future, CORSIA is to be applied as the sole, market based instrument aimed at regulating CO<sub>2</sub> emissions from international flights. This also includes flights within the EU, which will be included in the European Emissions Trading Scheme until 2020, according to the EU Commission. We expect that the EU system will be replaced by CORSIA with worldwide validity after this date.

**Which are the areas of emphasis for the Lufthansa Group's Environmental Management in 2017?**

One focus will be on the certification of an environmental management system for Lufthansa at its Munich hub. At the same time, work on our new Environmental Strategy 2030 continues, which we will introduce in the course of 2017. In this context, we are also analyzing if it would make sense to implement further central control parameters at the Group level and to interlink environmental care even more strongly with the Group's strategy. We're also working on implementing a new efficient software, aimed at further improving the capture, analysis and reporting of our environmental data. This application will also serve as a technical basis to expand the capture of environmental data step by step.

## Central action areas

Climate protection, and in particular fuel efficiency, active noise protection, energy and resource efficiency as well as sustainable innovation, research and development are the Lufthansa Group's central action areas with regard to climate and environmental responsibility. This approach was again confirmed in 2016 by the materiality analysis concerning the Group's commitment to sustainability (see page 17 ff., Strategy and management, and page 21 ff., Balance 2016).

### Climate protection

The fundamental approach for reaching the climate protection goals is the four-pillar strategy for climate protection developed jointly by the Lufthansa Group and the aviation industry. It combines technological, operational, infrastructural and economic measures that help reduce the direct CO<sub>2</sub> emissions of the Group's fleet of aircraft (see page 36 ff., Fuel consumption and emissions). From both economic and ecological points of view, fuel efficiency in flight operations in particular is an essential factor of success for the aviation group. It can be improved above all by investments in new aircraft as well as by implementing efficiency measures in the existing fleet. Monitoring and optimizing fuel consumption and thus also CO<sub>2</sub> emissions at the Group level is the responsibility of the department "Flight Operations Efficiency & Innovation".

In 2016, additional highly fuel-efficient types of aircraft joined the Lufthansa Group's fleet, including the Airbus A320neo at Lufthansa and the CS100 manufactured by Bombardier at SWISS (see page 28 ff., Fleet development). And this commitment is honored: In October 2016, the international rating organization CDP awarded the aviation group the title "Sector Leader Transportation" within the DACH region (Germany, Austria and Switzerland) in its annual climate ranking (see page 17 ff., Strategy and management).

### Noise protection

For many years, the Lufthansa Group has actively worked for the reduction of noise emissions inevitably associated with air transport. It is especially important to further lessen the noise burden on people living close to large hubs by implementing active noise protection measures. The Group's commitment includes five dimensions: continuous fleet modernization, refitting the existing fleet, application of optimized flight procedures, support for noise research and an open dialogue with stakeholders (see page 48).

### Energy and resource efficiency

Under the motto “avoid, reduce, recycle” the Lufthansa Group works on continuously optimizing its energy and resource efficiency. In this way, the Group companies ensure that required resources, such as energy and water, are always used conscientiously, both on the ground and in the air (see page 45 ff.).

### Research and development

The Lufthansa Group cooperates with partners in science and research to drive innovation forward and to continuously improve its own environmental commitment on the basis of proven data. Furthermore, the Group has supported climate research concerned with observing the Earth’s atmosphere for many years (see page 51). In addition, the Company participates in the further development and use of alternative fuels (see page 40 f.).

### External guidelines and memberships

In the area of climate and environmental responsibility, the companies within the Lufthansa Group take their bearings from voluntary external guidelines and participate in numerous sustainable initiatives. These obligations largely surpass the legal requirements.

For example, the commitment in the area of climate and environmental responsibility beyond the four-pillar strategy of the aviation industry is also based on the UN Global Compact and the United Nations’ Sustainable Development Goals (see page 17 ff., Strategy and management). In the area of noise protection the Lufthansa Group applies the “Balanced Approach” guidelines of the International Civil Aviation Organization (ICAO) for handling aircraft noise, which has been implemented in Europe by means of the 2014 EU Regulation on Noise-related Operational Restrictions. And with regard to energy and resource efficiency, the Group companies act in accordance with Germany’s energy efficiency law. The activities of Lufthansa Technik, which joined Hamburg’s “Environmental Pact” at its location in the Hanseatic city, are considered exemplary.

## Environmental management systems

The companies within the Lufthansa Group continuously expand their environmental management systems. This is an overview of the current situation:

**Lufthansa CityLine** was the first airline worldwide to introduce a professional environmental management system in 1999 and pass EMAS (Eco-Management and Audit Scheme), the most stringent European certification system. Since then, the program has been recertified annually. Simultaneously, the airline has been certified in accordance with the international environmental standard ISO 14001.

**Lufthansa** is currently setting up an environmental management system at its Munich location, which is expected to receive the EMAS seal by the end of 2017. Thus, the airline is creating important instruments for steering and documenting its environmental activities at the Munich hub. The preparations for the certification started in 2016, and included naming an environmental commissioner. Lufthansa is planning to extend the environmental management system to the entire airline as soon as it has been implemented in Munich.

**Swiss International Air Lines** is evaluating the introduction of an environmental management system.

**Austrian Airlines** is working on the implementation of an environmental management system certified in accordance with ISO 14001. Its implementation is to be completed by 2020.

**Lufthansa Cargo** has been certified according to ISO 14001 since 2008 at its location in Frankfurt and worldwide since the end of 2015. The recertification due in 2017 will be carried out according to the revised standard ISO 14001:2015. The new standard has more stringent requirements concerning risk assessment, stakeholder orientation, supplier management and the involvement of top management. Furthermore, time:matters, an additional subsidiary, is to be included in the worldwide certification.

**Lufthansa Technik** has been certified according to ISO 14001 since 1999. The company has also operated a job safety management program validated in accordance with the international specification OHSAS 18001 since 2008. Lufthansa Technik Milan, Lufthansa Technik Brussels and Lufthansa Technik Aero Alzey were certified in accordance with ISO 14001 and OHSAS 18001 for the first time in 2016, and in addition the overhaul operations in Sofia, Malta, Budapest and Shannon were integrated into Lufthansa Technik’s group certificate. All production-related locations are to be certified by these two standards by the end of 2018.

**The LSG Group** has run an internal environmental management system since 2008, which comprises the ten core elements of ISO 14000. All facilities worldwide that are fully-owned by the airline caterer are covered by this system. The system’s components are continuously supported by short- and long-term goals, activities and programs. In addition, the locations in Rome and Lisbon are certified according to ISO 14001.

**LZ-Catering** is working on introducing an environmental management system. The company is an Environmental Partner of the City of Hamburg and has been a member of Ökoprofit since 2010. Since July 2014, LZ-Catering has offered at least one daily “CO<sub>2</sub> friendly” main course at a large number of its company restaurants. Individual temporary specials with regional ingredients complement the menu offers at selected locations.

## Fuel consumption and emissions

The Lufthansa Group maintains its specific fuel consumption at a low level: In 2016, the aircraft in the passenger fleets needed 3.85 liters of kerosene on average to transport one passenger over a distance of 100 kilometers. The efficiency record achieved in the two preceding years was a mere 0.01 liters lower.

The Lufthansa Group's absolute fuel consumption increased by 1.2 percent compared with the previous year. For many years, the aviation group has successfully decoupled transport performance from fuel consumption. Transport performance has increased by 355 percent since 1991, while kerosene consumption rose by 189 percent (see graph page 39). SWISS was the most efficient Group airline during the reporting year with an average specific fuel consumption of 3.44 liters per 100 passenger kilometers (see page 38).

The development of specific consumption depends on numerous factors, including overall load factor and passenger load factor. The overall load factor increased by 0.1 percent during the reporting year, while the passenger load factor declined by 1.4 percent. Another aspect with an effect on fuel efficiency was the geopolitical developments during the reporting year, which led to weak demand

from leisure travelers on long-haul routes from Asia and North America to Europe, especially in the second and third quarters. Similarly, strikes that were threatened and strikes conducted in the context of negotiations concerning collective agreements have negative effects on passengers' reservations patterns, among other factors.

On the other hand, the new highly fuel efficient types of aircraft, such as the A320neo, A350-900 and the C Series, did not fully make their contribution to lowering fuel consumption during the reporting year, as some of the first ones joined the respective fleets only in the second half of the year (see page 28 ff., Fleet development). In addition, there are not yet enough aircraft of these types in service to have a palpable effect on the entire Group fleet, which comprises more than 600 aircraft. However, over the years ahead, phasing new aircraft into service will have a more distinct effect, so that the Lufthansa Group expects a significant efficiency increase. The Group therefore continues to aim at achieving the industry's goal of an annual efficiency increase of 1.5 percent. Since 2006, the aviation company has achieved an improvement in fuel efficiency of 12.18 percent.

Fuel efficiency in flight operations is a significant factor for success for the Lufthansa Group, both from an economic and an ecological point of view.



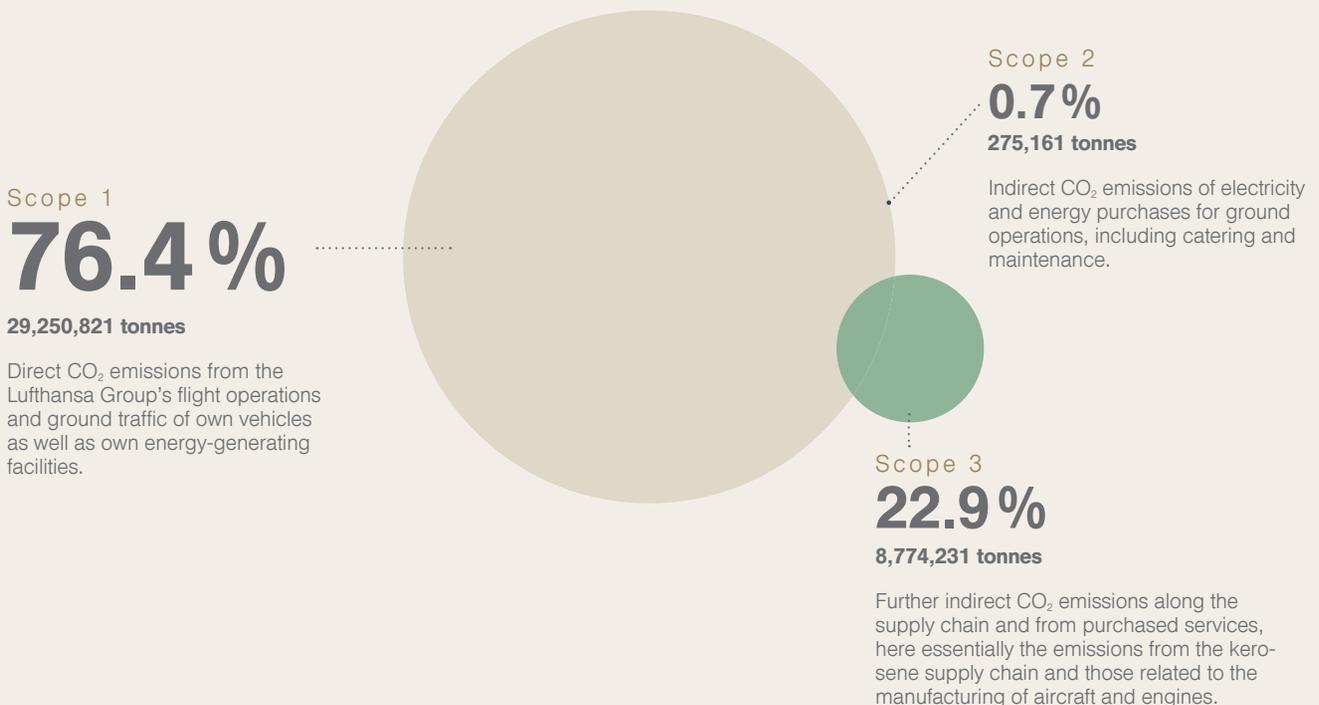
### CO<sub>2</sub> emissions according to GHG Protocol

The Lufthansa Group determines its CO<sub>2</sub> emissions on the basis of the Greenhouse Gas Protocol (GHG Protocol), which divides emissions into three main categories (scopes). All direct emissions from flight operations, which are shown in the illustration as "Direct and indirect CO<sub>2</sub> emissions of the Lufthansa Group", were determined and verified on behalf of the aviation group in accordance with the European emissions trading scheme. Beyond that, the Group has recorded indirect emissions for some years, caused by its business activities. All recorded and calculated direct and indirect CO<sub>2</sub> emissions are verified externally (see page 90, Verification statement). The so-called CO<sub>2</sub> footprint helps the Lufthansa Group to identify and evaluate its significant environmental effects with greater precision, pursuing the goal of developing more effective options for reduction as the next step (see page 41 f., *Balance 2016*).

**Fuel efficiency as a central action area**

Fuel efficiency is of central importance for the Lufthansa Group, in particular as fuel expenditure is a significant cost item for the Company. But the Lufthansa Group is motivated not only by economic, but also by ecological considerations to use the required kerosene as efficiently as possible. Doing so contributes to reducing the effects of flying on people and the environment, and securing the Company's success over the long-term. Moreover, fuel efficiency is an important expectation on the part of stakeholders and one prerequisite the Lufthansa Group must meet in order to fulfill national, regional or industry-specific energy and emissions regulations (see page 33 ff., Strategy and management). Through the action areas "Continuous efficiency increases" and "Innovation and digitalization" the topic is also anchored in the strategic program "7to1 – Our Way Forward", which helps secure the Lufthansa Group's future viability.

Fuel efficiency also ensures that air transport can meet future challenges. Aviation is and will remain a growth industry. As transport volumes rise strongly, absolute fuel consumption and thus emissions also increase – despite continuous efficiency gains. In 2016 alone, the number of passenger kilometers sold worldwide increased by 6.3 percent compared with the preceding year, according to figures published by the International Air Transport Association (IATA). According to IATA forecasts the number of passengers is to nearly double by 2035, from 3.8 billion in 2016 to 7.2 billion, with the strongest growth expected in the Middle East and the Asia-Pacific region. The Lufthansa Group and the entire aviation industry prepare for these future challenges with ambitious climate protection goals (see page 33, Strategy and management).

**Direct and indirect CO<sub>2</sub> emissions of the Lufthansa Group 2016**

# Passenger transportation 2016<sup>1,2</sup>

## Specific fuel consumption and CO<sub>2</sub> emissions

Specific fuel consumption in liters per 100 passenger kilometers (l/100 pkm) and specific CO<sub>2</sub> emissions in kilograms per 100 passenger kilometers (kg/100 pkm)



**3.85** l/100 pkm

**9.71** kg/100 pkm

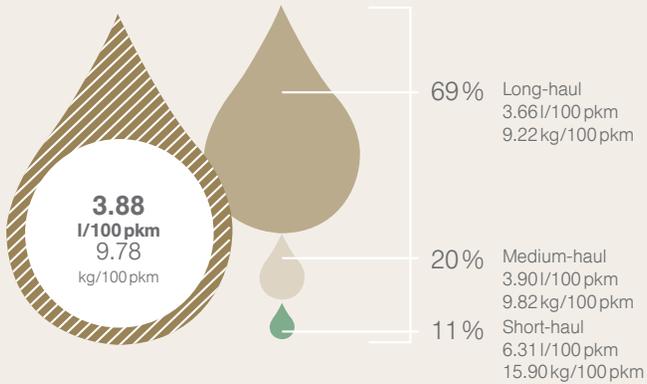
**60%**  
Long-haul  
3.51 l/100 pkm  
8.85 kg/100 pkm

**25%**  
Medium-haul  
3.98 l/100 pkm  
10.02 kg/100 pkm

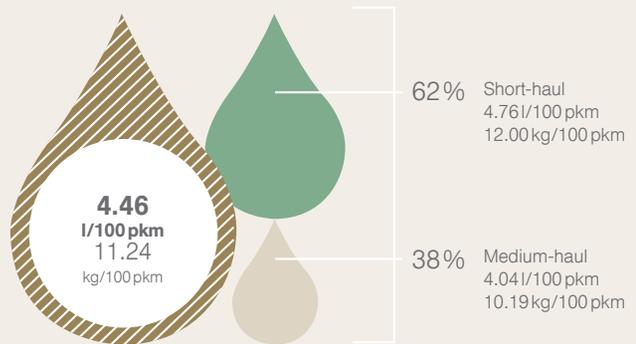
**15%**  
Short-haul  
5.86 l/100 pkm  
14.77 kg/100 pkm



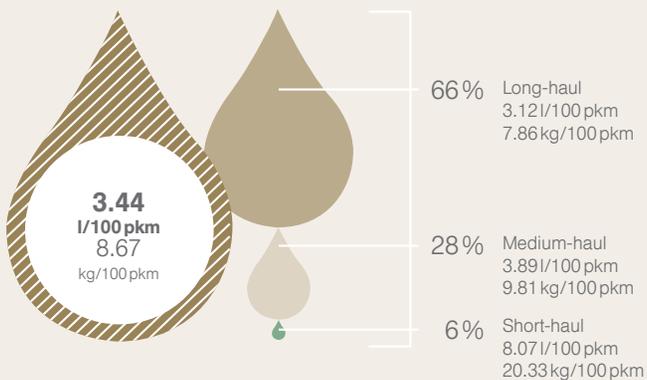
Lufthansa



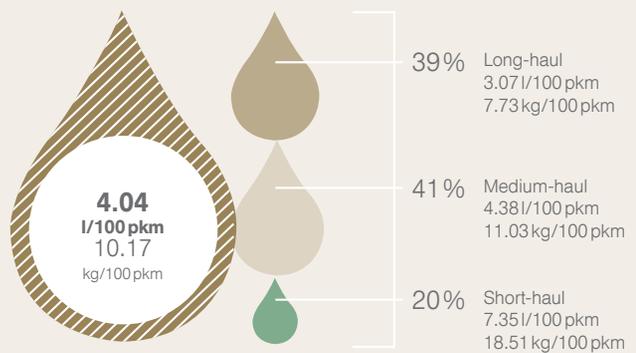
Eurowings



SWISS



Austrian Airlines



# Freight transportation 2016<sup>2,3</sup>

## Specific fuel consumption

in liters per tonne kilometers (l/tkm)

# 0.280

l/tkm

## Specific CO<sub>2</sub> emissions

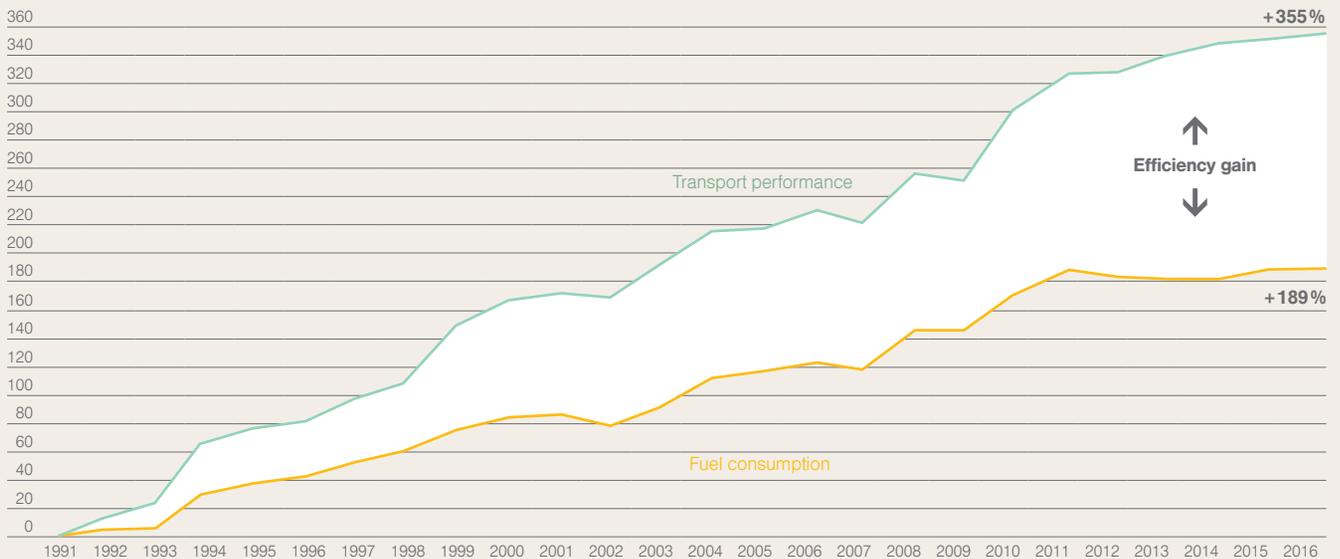
in kilograms per tonne kilometers (kg/tkm)

# 0.70

kg/tkm

## Decoupling of transport performance and fuel consumption<sup>2</sup>

Changes compared to 1991 in percent, values for the fleet of the Lufthansa Group



1 Average specific fuel consumption in l/100 pkm as well as the shares of the respective traffic areas in total passenger fuel consumption

2 All scheduled and charter flights operated by Lufthansa (including Lufthansa CityLine and Air Dolomiti), Eurowings (including Germanwings), SWISS (including Edelweiss Air), Austrian

Airlines and Lufthansa Cargo. Excluding services of third parties as the Company cannot influence their performance.

3 On the basis of freight tonne kilometers (FTKT), transported on both cargo and passenger aircraft.

### Organizational foundations

The Lufthansa Group's department Flight Operations Efficiency & Innovation manages all projects concerning the issue of fuel efficiency. Its experts have the task of identifying, developing and implementing approaches, concepts, projects and processes in flight operations that are aimed at improving the flying Group companies' fuel efficiency continuously and over the long-term.

## Four pillars for climate protection

The aviation industry's established four-pillar strategy, which comprises numerous environmentally relevant measures, serves as a guideline for all fuel-efficiency activities pursued by the Lufthansa Group. Its scope ranges from technical progress and infrastructure improvements to operative measures and economic instruments.

### Pillar 1: Technological progress

The most effective way to further decrease fuel consumption is to invest in advanced and highly efficient aircraft and engine technologies. In 2016, the Lufthansa Group consistently continued the largest fleet modernization program in its history (see page 28 ff., Fleet development). The Group expects to take delivery of 205 aircraft by 2025, including more aircraft of the highly eco-efficient

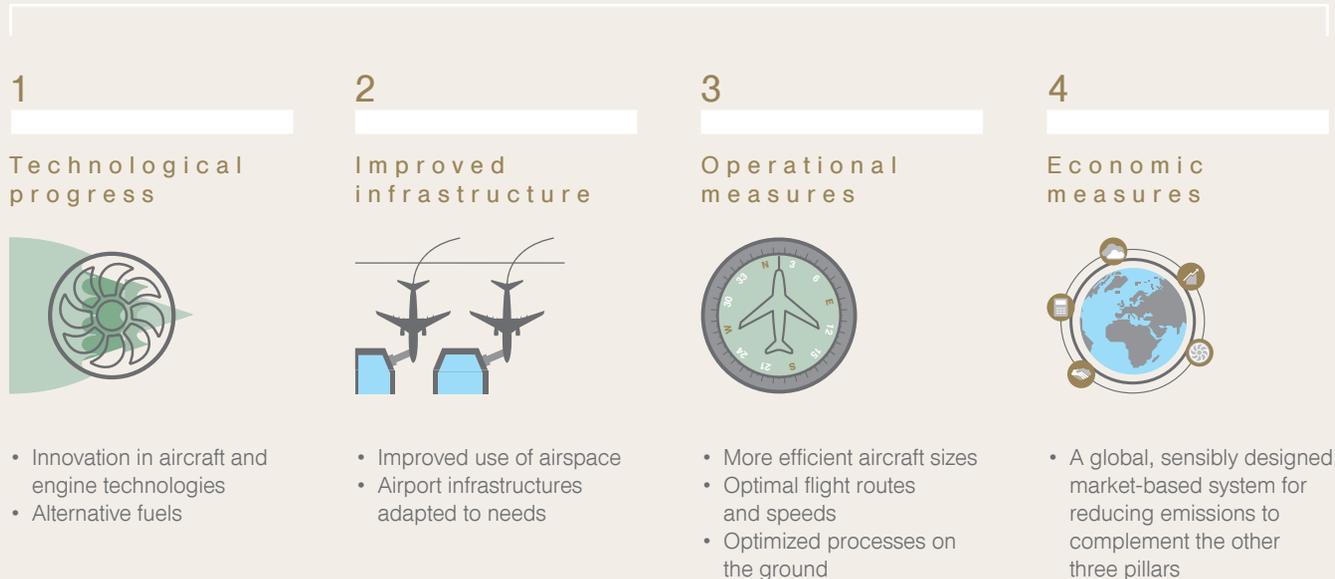
types A350-900 and A320neo as well as the state-of-the-art long-haul type Boeing 777-9.

### Research and use of alternative fuels

The use of alternative fuels represents another step towards the air transport of the future. As biokerosene has a significantly lower net CO<sub>2</sub> balance sheet value, it allows a sustainable reduction of emissions from flight operations. Following this approach, the conflict of objectives that arises from growing demand for mobility worldwide and finite resources of fossil fuels can be resolved. The Lufthansa Group undertook some pioneer work to this end in 2011, when it tested the use of biofuel in regular flight operations for about six months as a trial run in the context of the project "BurnFAIR – Potentials of alternative fuels in operational conditions". In addition to its own research work, the aviation group has been actively committed for many years to a number of initiatives such as aireg (Aviation Initiative for Renewable Energy in Germany) and SAFUG (Sustainable Aviation Fuel Users Group).

In February 2015, an interim report was published for the EU research project "High Biofuel Blends in Aviation", an initiative jointly launched in 2013 and since carried out by the Lufthansa Group and the German Armed Forces' Research Institute for Materials, Fuels and Lubricants (see page 55, *Balance* 2014). The two partners have gained important insights into the blending characteristics of conventional fossil kerosene types and various

## Four pillars for climate protection



Lufthansa Technik's EVE test unit on the test bed in Hamburg. In this setup, DLR scientists and Lufthansa jointly analyzed the emission-related effects of biofuels. The EVE test unit is a CFM56 aircraft engine equipped by Lufthansa Technik with additional measuring instruments for test purposes.



new biokerosenes in the context of this project. The final report was completed in 2016; it contains additional significant insights into the emissions characteristics of biokerosene and has been published on the European Commission's website.

In 2016, the Lufthansa Group refueled its aircraft at Oslo Airport with a fuel blend that contained 5 percent biokerosene. Air BP Aviation, the Norwegian airport operator Avinor and the biofuel specialist SkyNRG joined forces to offer jet biofuel to airlines serving Gardermoen Airport. For a period of one year, Air BP Aviation fed 1.25 million liters of sustainably produced and appropriately certified biofuel into the tanks at Oslo Airport. During this time, about 5,000 flights operated by the airlines of the Lufthansa Group flew on jet fuel blended with biokerosene. They included Lufthansa, SWISS, Austrian Airlines, Germanwings and Brussels Airlines.

## Pillar 2: Improved infrastructure

### Single European Sky

The largest climate protection project in European aviation is to establish a standardized airspace above Europe. This Single European Sky (SES) will help airlines emit 10 percent less CO<sub>2</sub> and save about 5 billion euros in fuel costs every year. Today, however, about 60 air traffic control centers are responsible for air safety in 27 different national systems with more than 650 sectors; a system that does not always allow aircraft to follow an optimum route to their destinations.

The goal of SES is to remove this kind of patchwork and to steer air traffic flows substantially more efficiently than is currently the case. An important milestone on the path toward the Single European Sky is the standardization and modernization of the European

aviation infrastructure. For this purpose, the European Commission set up the SESAR (Single European Sky ATM Research) program. The goal of this project is to develop, test and implement Europe-wide new technologies, procedures and standards that contribute to harmonizing and optimizing European air traffic management.

The Lufthansa Group's airlines and Lufthansa Systems are actively involved with their respective expertise in a number of SESAR research and demonstration projects as well as standardization initiatives. The synchronization of SESAR with its American counterpart "NextGen" as the basis for global interoperability of air traffic control systems has a high priority in this context. The first modernization package was integrated by the European Commission in the Pilot Common Project (PCP). The implementation of these technologies in daily operations is jointly coordinated by the members of the industry consortium "SESAR Deployment Manager". Lufthansa is a member of this consortium and provides its own experts. Since the start of the introduction phase in 2014, the first positive effects from optimized routings and flying times have been observed in the daily operations of airports, air traffic control organizations and airlines.

In 2016, the Lufthansa Group's experts participated in the following three demonstration projects, among others:

In the framework of the project **Free Solutions**, whose goal is the introduction of more direct flight routings under scheduled flight conditions, 68 flights were able to travel on such routings in Europe. The routes from Frankfurt to Nice, Málaga, Algiers, Barcelona and Valencia as well as the route from Munich to Paris could thus be shortened permanently. The quantity of kerosene saved in this way each year corresponds to the fuel burn of about 200 flights between Frankfurt and Zurich.

SWISS is actively involved in the validation project iStream. Since mid-October 2016, the concept has been binding for approaches in Zurich and makes a sustainable contribution to cutting kerosene consumption and CO<sub>2</sub> emissions.



SWISS was able to demonstrate in the project **iStream** – together with Swiss air traffic control authority skyguide and Zurich Airport – that targeted coordination between air traffic control and airlines can help avoid capacity bottlenecks in approach traffic and shorten approach distances. With iStream, the number of holding patterns flown during the morning flight bank at Zurich Airport was reduced by 96 percent, while the average approach distance flown was cut by 30 percent. The concept has been binding for approaches in Zurich since mid-October 2016 and makes a sustainable contribution to cutting kerosene consumption and CO<sub>2</sub> emissions. Its expansion to the airports Paris Charles-de-Gaulle, Paris Orly and London Heathrow is planned for 2017.

In the context of the project **Augmented Approaches to Land (AAL)**, the evaluation of test flights was used by Fraport, DFS, Lufthansa and others to determine if a more precise adherence to the flight path, supported by new flight procedures, might make controlling the distribution of noise emissions more effective (see page 50). In 2016, approaches were flown for this purpose in Frankfurt and Bremen, among other locations, with the A380 and B747-8 fleets, and additionally with three A319s specifically equipped for these trials. In 2017, further aircraft in the A320 family will be specifically equipped and test flights will be continued in Frankfurt.

### Pillar 3: Operational measures

Operational measures include the deployment of efficiently sized aircraft; the improved utilization, testing and introduction of new flight procedures; as well as the determination of optimum flight routes and flight speeds. These are complemented by programs for long-term weight reductions, the development of intelligent software tools and the introduction of increasingly more efficient processes on the ground.

Company-wide, the experts at the Lufthansa Group implemented a total of 183 fuel efficiency projects in 2016, which reduce CO<sub>2</sub> emissions by 620,000 tonnes per year. This quantity of fuel conserved is enough for an Airbus A320 to fly once daily from Frankfurt to Berlin and back for one-and-a-half months. The emphasis during the reporting year was placed on projects concerning engine modifications (see table) and projects involving flight planning and management.

In addition, the Lufthansa Group concluded the introduction of lightweight trolleys in 2016. Since the project's launch in 2011, about 30,000 service trolleys have been replaced by new models that weigh about 35 percent less than their predecessors.

#### More lightweight containers and pallets

Meanwhile, Lufthansa Cargo plans to replace all standard containers with more lightweight variants by 2020. At the end of 2016, the air freight specialist had replaced almost 70 percent of its containers, including all units of the AKE type. The replacement of the AKH air freight containers is currently underway, and about 50 percent of the DQF model has also been exchanged for a lighter successor. In addition, Lufthansa Cargo is cooperating with the subsidiary Jettainer to find a solution for more lightweight pallets.

In combination with other measures, such as polishing fan blades, the more lightweight containers also have a positive effect on the strategic partnership between Lufthansa Cargo and the transport and logistics provider DB Schenker. Since the beginning of the cooperation in 2011, the two partners have already avoided emitting 10,000 tonnes of CO<sub>2</sub>. Another 10,000 tonnes of emissions are to be avoided by 2020.

**“Sharkskin” saves kerosene**

In the framework of the research project FAMOS, Lufthansa Technik – together with its partners Bremer Werk für Montagesysteme (bwm), Airbus Operations GmbH and the subcontractor Fraunhofer IFAM – is working to develop a highly automated system to apply low-drag microstructured surfaces for commercial aircraft (see page 10, *Balance* 2015). The so-called riblets resemble the fine ribs on the scales of fast-swimming sharks and are therefore referred to as artificial sharkskin. Thanks to a reduction of air resistance, this innovative technology is expected to help conserve up to 1.5 percent of fuel. On December 2, 2016, the Lufthansa “sharkskin” plane took off to Montreal for its maiden flight, marking the start of

a two-year test phase for the riblet structure. During this time, the research partners will assess the riblets’ durability in flight operations and the visual appearance of larger riblet-covered surfaces, in particular with regard to surface dirt.

At the same time, Lufthansa Technik further developed its efficient engine wash Cyclean® during the reporting year. Thanks to this highly efficient cleaning method for aircraft engines, airlines are able to reduce their kerosene consumption by up to 1 percent (see page 51, *Balance* 2016). Currently, more than 40 airlines worldwide use Lufthansa Technik’s Cyclean® product. A total of about 80,000 Cyclean® engine cleanings have already been performed.

## Top ten measures for the sustainable reduction of fuel consumption and thus CO<sub>2</sub> emissions

Airline	Measure	Expected annual CO <sub>2</sub> savings in metric tonnes	Project duration / implementation period
<b>SWISS</b>	<ul style="list-style-type: none"> <li>Global Dispatch Network (GDN) and Godwit, including mission support, offers new planning options and policies that will reduce fuel burn substantially</li> </ul>	40,114	2014 - 2017
<b>Lufthansa</b>	<ul style="list-style-type: none"> <li>The Trent 500 engines of the aircraft type Airbus A340 are to be modified by the installation of optimized components</li> <li>Service trolleys were exchanged step-by-step for lighter models</li> <li>Fuel calculation principles were changed to avoid unnecessary transport fuel, while maintaining safety reserves.</li> <li>The Trent 900 engines of the aircraft type Airbus A380 are to be modified by the installation of optimized components</li> <li>The Trent 700 engines of the aircraft type Airbus A330 are to be modified by the installation of optimized components</li> <li>Long-haul flights were monitored in the air and supported with up-to-date information</li> <li>The flight profile optimizer calculates the optimum flight profile (altitude and speed) more accurately with the inclusion of current weather data than was previously possible and flight profiles are displayed on the “Electronic Flight Bag” (EFB) in the cockpit</li> <li>All records required for a flight’s operation are provided electronically in the “Electronic Flight Folder” (eFF) on the “Electronic Flight Bag” (EFB)</li> <li>22 aircraft of the existing A320 fleet were retrofitted with sharklets identical to those of the A320neo</li> </ul>	32,494 30,621 28,273 15,145 25,253 12,026 11,011 9,689 9,273	2012 - 2020 2011 - 2016 2015 - 2016 2013 - 2020 2012 - 2019 2014 - 2016 2014 - 2016 2016 2013 - 2016



## OMEGA “TRACKS”: SMALL SAVINGS WITH GREAT EFFECT

Since the end of 2016, pilots in all Lufthansa cockpits have had the option of having the so-called OMEGA “Tracks” displayed. The eponymous software helps pilots find the shortest route by analyzing flight tracks stored in the flight data recorder. The tracks thus generated for the current flight are fed back into the pilots’ briefing. The pilots see these on the electronic navigation map in the cockpit. Thanks to the displayed shortcuts from previous flights, pilots can actively request such tracks from air traffic control, if appropriate. With the introduction of OMEGA “Tracks” the distance flown has been reduced by 1.1 nautical miles (nm) on average on short-haul routes and by 3.5 nm on long-haul routes. Is it actually worth doing? It certainly is. Extrapolated to all flights, Lufthansa conserves about 8,500 tonnes of kerosene per year. This quantity corresponds to the fuel needed for about 80 flights from Munich to San Francisco. The next step is to have all other Group airlines use this new technology as well.

## Pillar 4: Economic measures

Economic incentive systems are to be understood as a complement to the preceding pillars. For the Lufthansa Group, the most effective instrument in this area is a worldwide-valid, market-based and competition-neutral system for CO<sub>2</sub> compensation (also called carbon offsetting). At the beginning of October 2016, the community of states adopted a global climate agreement covering air transport in the context of the United Nations’ International Civil Aviation Organization (ICAO). By means of this global, market-based climate protection instrument, also known as CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation), growth-related CO<sub>2</sub> emissions in international civil aviation are to be compensated from 2020 by CO<sub>2</sub> savings achieved by climate protection projects. This makes air transport the first industry worldwide to have its own climate agreement. So far, 66 nations representing 86.5 percent of international air traffic have already voluntarily joined CORSIA. The Lufthansa Group – together with the aviation industry – has supported a climate agreement for many years (see page 34, Three questions for: Dr. Karlheinz Haag) and welcomes that a decision by consensus among states has been reached at United Nations level.

By contrast, the EU currently still applies an emissions trading scheme, which is applied to all intra-European flights. In the opinion of the Lufthansa Group, insular solutions of this kind are the wrong approach, as they unilaterally burden European airlines in contrast to airlines outside Europe. Other options for limiting the effects of CO<sub>2</sub> emissions from air transport are voluntary CO<sub>2</sub> compensation schemes. The Group airlines Lufthansa, SWISS and Austrian Airlines as well as the Lufthansa subsidiary AirPlus have offered their customers such programs for many years (see page 56, CO<sub>2</sub> compensation).

## Areas of emphasis in 2017

The Lufthansa Group will consistently continue its efficiency programs and fleet modernization in 2017. In addition, further potentially efficiency-increasing measures include intelligently combining different data sources by means of business intelligence tools such as Qlik or Tableau. Moreover, Lufthansa will use the software OMEGA, which it developed together with Honeywell Aerospace, and in particular the module “Tracks”. The goal is to analyze data collected in flight and provide these insights to pilots through feedback loops.

## Energy and resource management

Keeping air transport's effects on the environment as limited as possible is one of the Lufthansa Group's most important concerns. First and foremost, the aviation group continuously focuses on increasing fuel efficiency in flight operations. But attention is equally given to ground activities with the aim of applying sustainable and responsible business practices.

Making economically and ecologically efficient use of energy and resources is of decisive importance in all business segments across the Lufthansa Group. In addition to meeting legal requirements, it is important for the Group to identify sustainable potentials for the sparing use of electricity and water, and to develop corresponding solutions. Equally important are measures to reduce and recycle waste materials. Another essential approach on the ground is to implement energy-saving and resource-conserving measures in planning, modernizing and constructing buildings. This endeavor is based above all on the Group's strategic environmental program, which was implemented in 2008 (see page 36, *Balance* 2015). Possible energy-related optimizations in buildings are particularly discernible from results of energy audits in accordance with the EU Energy Efficiency Directive (EED).

### EU Energy Efficiency Directive

Since December 5, 2015, companies above a certain size in the EU have been obliged to undergo an energy audit at least once every four years. Accordingly, 120 Lufthansa Group companies were audited during the reporting year to meet this deadline. Among other feedback, these audits produced more than 300 suggestions concerning the improvement of energy efficiency of buildings. In general, audit results serve the aviation company as a base from which to continuously optimize its energy management. The initial contacts for all questions in this area are the experts at the department Facility Management, Standards and Steering.

Within the new matrix organization the Group invests in cooperation between its companies in the area of energy management with the goal of creating synergies and strengthening the exchange of best-practice examples. Group-wide monitoring makes it possible to implement energy conservation measures rigorously and to obtain an overview of all savings potentials. Against this background, the Lufthansa Group at its Frankfurt location has participated in the Business Energy Efficiency Network of utility Mainova.

### Greater efficiency, lower energy consumption

At energy-intensive service companies Lufthansa Technik and LSG Group, the topic of energy management has a particularly high priority. For this reason, both use their own concepts and systems that are tailor-made for the particularities of their business activities.

#### Lufthansa Technik

Specialized environmental protection solutions for customers and corresponding measures concerning the company's own work processes and locations are of central importance for Lufthansa Technik. A proprietary building standard, applied company-wide, helps the leading provider of MRO (Maintenance, Repair & Overhaul) services to further increase the energy efficiency of its locations worldwide. In addition, the Lufthansa Technik Group launched a carbon-save program. Its goal is to reduce CO<sub>2</sub> emissions by 30 percent by 2018, compared with 2012. At the end of 2016, more than 60 percent of this reduction had already been achieved.

### LSG Group

In recent years the LSG Group has initiated numerous programs aimed at conserving energy and water, and continued this approach during the reporting year. In addition, the airline catering subsidiary of the Lufthansa Group is planning to increase the recycling ratio in 2018, which is measured by the Key Performance Indicator (KPI) "Waste per meal in grams".

The KPIs of the LSG Group also comprise water consumption per meal and energy per square meter of operations surface. In 2013, the company introduced two additional KPIs: energy consumption per meal and waste quantity recycled as percent of total waste. Furthermore, it defined new KPIs per region for the period 2017 to 2020.

The Regional Environmental Manager (REM) responsible for a certain area implements the LSG environmental programs in cooperation with the regional management team and also accompanies the monitoring. Further components of this process are employee training and local workshops on the subject of sustainability. In addition, the LSG Group is a member of "LEEN 100" (Learning Energy Efficiency Network), which was jointly initiated by the City of Frankfurt and business consultancy Arqum with the goal of improving CO<sub>2</sub> values in the Rhine-Main area.

## Waste and recycling management



Permanently reducing waste quantities on board or increasing its recycling ratio are important considerations for the Lufthansa Group's waste management. Beyond legal requirements, the internal initiative "Flygreener" contributes to reaching this goal Group-wide (see page 57, *Balance* 2016). Its objective is to help reduce waste volumes continuously, especially in flight operations. In recent years the aviation group has implemented numerous measures on this base, aimed at reducing waste quantities and improving related processes aboard aircraft.

Specially trained flight attendants act as "Ambassadors on Board" and support crews with tips on how to cut waste quantities or recycle more effectively. Furthermore, the Company regularly makes its flying personnel more aware of this issue by setting up information stands. Over the mid-term, practice-related training, such as web-based courses for existing employees and trainers covering the topic in basic courses are planned. Close cooperation between the LSG Group and the Lufthansa Group's hub airlines is set to create additional synergies.

### Onboard waste analyzed

During the reporting year, Lufthansa and LSG Sky Chefs employees analyzed the waste from 20 long-haul and 50 short-haul flights in Munich in the context of a so-called empty-out campaign. The goal was to determine the share of reusable materials in waste trolleys, thus demonstrating the potential of "Flygreener". The next step for the participating experts is to define new processes to ensure that recyclable materials are better presorted on board, for example by using a recycling trolley and alternative liquid disposal. The campaign will be repeated in Munich in 2017. In addition, "Flygreener" is planning to sort and analyze the complete load of service items on four long-haul aircraft in Frankfurt.

## Sustainable construction

The Lufthansa Group is guided by energy-saving and resource-conserving considerations in all aspects concerning its buildings. In this context, it takes current standards into consideration for new construction and modernizations or energetic optimizations of existing buildings. In 2016, the aviation group already implemented a portion of corresponding recommendations that were drawn from the EED audits for energy savings in buildings. The remaining recommendations are currently being evaluated.

Among the concrete measures that produce energy savings are setpoint adaptations, timer switch profile adaptations for ventilation and air conditioning systems, and changing to light emitting diodes (LED) in hangars. For example, in 2016 Austrian Airlines replaced its hangar lighting in Vienna with an LED system, leading to sustainable savings of energy and avoidance of CO<sub>2</sub> emissions for the airline. For 2017, the Lufthansa Group is planning to change further lighting systems to LED technology.

## Electricity instead of internal combustion engines

In the area of electromobility, the Lufthansa Group sees itself in a pioneering role within the aviation industry. To shape resource efficiency even more sustainably, the Group researches and tests this future-oriented technology in vehicles on the ground. In all electromobility projects, the aviation group is guided by the objectives of the International Air Transport Association (IATA). The individual projects are also part of the aviation industry's four-pillar strategy for climate protection (see page 40 ff.).

Lufthansa LEOS has had an electrically powered eTug in daily operational use since 2016.



## E-PORT AN drives electromobility

Aviation still needs gasoline or diesel for vehicles on the ground. Continuously reducing fuel consumption and switching individual vehicle types step-by-step to electric propulsion technologies is the ambitious goal of the initiative E-PORT AN at Frankfurt Airport. In addition to the Lufthansa Group, Fraport AG, the State of Hesse and the Rhine-Main Model Electromobility Region are committed to this project. It is scientifically accompanied by the Technical University Darmstadt and the Technical University Berlin. The initiative is supported by Germany's Federal Ministry for Transport and Digital Infrastructure and in 2013 was honored as "Lighthouse Electromobility Project" by Germany's Federal Government. During the reporting year, the project partners gave passengers the opportunity to discover more about the numerous electromobility activities at Germany's largest civil airport by visiting the first "Green Gate" worldwide (see page 53, *Balance* 2016).

## E-mobility projects at the Lufthansa Group

### TaxiBot test phase ended

From December 2014, the Lufthansa Group and patent holder IAI (Israel Aerospace Industries) tested the pilot-controlled diesel-electro hybrid aircraft tug TaxiBot in the Boeing 737 fleet in Frankfurt. As the last B737s left the fleet in October 2016 (see page 28 ff., Fleet development), test operations involving scheduled Lufthansa flights ended as well. A further important milestone was the TaxiBot's EASA certification for the Airbus A320 fleet at the beginning of

May 2017. Tests are currently being planned for late summer 2017 to run trials of new processes. The goal is to increase operational efficiency by means of these innovative tugs. A noise and emissions assessment by the Technical University Darmstadt showed a significant reduction potential that can be realized when the aircraft's engines remain switched off during taxiing.

### Addition to eTug fleet

In April 2017, Lufthansa LEOS ordered the second electro-powered eTug. The first aircraft tug of this type has been used in daily operations since 2016. Smaller improvement potentials were identified in the context of the accompanying project, which will be taken into account in the construction of the second vehicle.

### eLift – The catering lift truck of the future

With the project "eLift" LSG Sky Chefs pursues the goal of developing the electric-powered catering lift truck of the future. Currently, the eLift is under construction and is to be delivered in July 2017. The project is a cooperation with companies Doll Fahrzeugbau and Terberg as well as the Technical University Berlin. The use of electrically powered propulsion systems will lead to measurable reductions of all types of emissions, primarily noise and CO<sub>2</sub>.

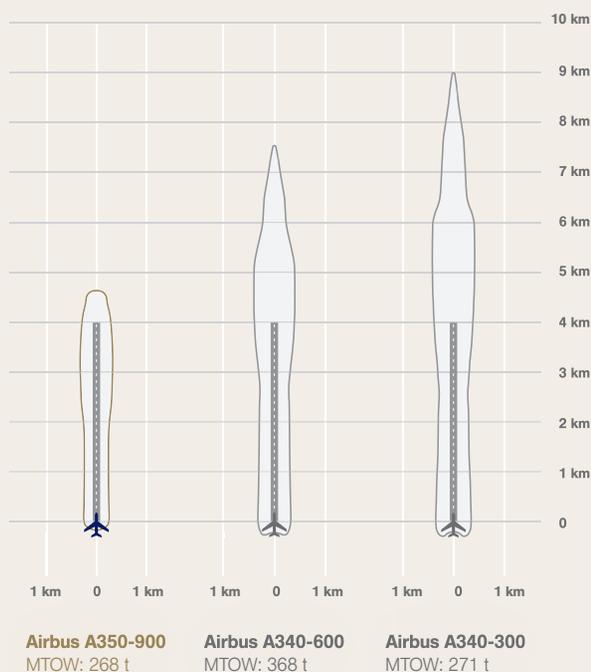
Independent of E-PORT AN, the Company regularly takes delivery of new catering vehicles around the world. As a rule, these fulfill the current emissions standards and thus offer improved fuel efficiency. LSG Group is planning to replace a larger number of older vehicles during 2017.

## Active noise protection

For many years, the Lufthansa Group has applied numerous activities and measures to achieve a noticeable decrease of the unavoidable noise emissions in areas surrounding airports. The goal is to reduce noise at the source over the long-term and to develop optimized flight procedures together with system partners. Continuous investments in modern and particularly quiet aircraft make a significant contribution in this area.

### Noise contours compared A350-900 vs. A340-300/600

Compared to previous models, the Airbus A350-900 shows a 40–50 percent lower noise contour. The 85 dB(A) maximum noise level contours are shown for a takeoff with Lufthansa standard takeoff procedures and maximum takeoff weight (MTOW). By comparison, a maximum noise level of 85 dB(A) is produced by a truck passing at a distance of five meters (16 feet) in city traffic.



Source: Airbus, information as of: 11/2016

With regard to noise emissions, 610 of the 613 aircraft in the active fleet of the Lufthansa Group fulfill the currently most stringent so-called Chapter 4 noise standard of the International Civil Aviation Organization (ICAO), which has been in effect since 2006 for new aircraft (see overview page 100). The Chapter 14 standard, which is significantly more strict, will take effect on December 31, 2017 for regional aircraft that are newly certified, and for all other types of aircraft on December 31, 2020. Aircraft of the latest generation, such as the Airbus A350-900, already fulfill the highly demanding requirements of this standard.

Active noise protection is one of the Lufthansa Group's central action areas. The materiality analysis developed in 2016 shows that the topic is "important" for the stakeholders and even "very important" for the Group (see page 17 ff., Strategy and management). The Lufthansa Group's commitment to active noise protection comprises five dimensions:

- Investments in more modern and thus quieter aircraft
- Retrofitting of aircraft in the existing fleet
- Participation in noise research
- Development of optimized flight procedures in cooperation with system partners
- Continuous dialogue and exchanges with people living close to airports, and other interest groups

When implementing concrete measures, the Group always takes the factor of economic efficiency into consideration too.

### Investments in more modern aircraft

During the reporting year, the Lufthansa Group continuously pursued its fleet modernization and added a new aircraft to the fleet almost at a weekly rhythm. Among others, the Group airlines received Airbus A320neo, Airbus A350-900 and Bombardier C Series 100 aircraft (see page 28 ff., Fleet development). As these advanced types of aircraft fly especially quietly, these investments mean a perceptible and sustainable lessening of noise emissions for people living near airports.

In mid-2016, Swiss International Air Lines became the first airline worldwide to start operations with the new Bombardier CS100. Compared with the aircraft operated so far, noise emissions during takeoff drop by half with this model. As a result, with the C Series 100 SWISS makes an important contribution to the quality of life for people near airports. As a replacement for the Avro RJ100 and the A319 fleets, the airline has 15 CS100s and 15 CS300s on order, and took delivery of the first CS300 at the end of May 2017. Incorporating all 30 C Series is to be completed by the end of 2018.

The Airbus A350-900 is another aircraft to fly especially quietly. Lufthansa started operations with the first aircraft of this type at the end of 2016. A new type of engine, the Rolls-Royce Trent XWB, weight reductions and an advanced aerodynamic design ensure that the A350-900 is significantly quieter during takeoff than comparable types of aircraft. Compared with predecessor models, the noise footprint of this long-haul aircraft is about 40 to 50 percent smaller (see illustration on the left). The noise emissions of the A350-900 are far below the required Chapter 3 noise standard and fall below the Chapter 3 noise limit values by 31.9 EPNdB (Effective

The Airbus A350-900 is significantly quieter during takeoff than comparable types of aircraft.



Perceived Noise dB). This makes the A350-900 the quietest aircraft in the entire long-haul fleet operated by the Lufthansa Group.

On short- and medium-haul routes, the Airbus A320neo is by far the most efficient and quietest aircraft thanks to new engine technology and improved aerodynamics. In January 2016, Lufthansa became the first customer worldwide to take delivery of this model. In comparison with an A320 in the existing fleet, the A320neo features a noise footprint that is about 50 percent smaller (see illustration page 58, *Balance* 2016). In October 2016, Lufthansa phased out its last six Boeing 737-300s, so that the airline operates only quieter aircraft from the A320 family on its entire continental route network.

### Noise-reducing technologies for the existing fleet

At the beginning of 2014, Lufthansa was the first airline worldwide to start operations with an Airbus A320 equipped with noise-reducing vortex generators, thus setting an industry standard (see page 59, *Balance* 2016). In the meantime, Lufthansa Technik retrofitted all of the airline's A320s with this type of vortex generator. At the same time, Airbus only delivers new aircraft of this type equipped with this modification.

In 2016, SWISS also equipped its aircraft of the Airbus A320 family with the noise-reducing vortex generators. This modification significantly reduces noise burdens in the regions around Zurich and Geneva airports. In fall 2016, Austrian Airlines also launched the retrofit of its A320 aircraft with vortex generators, which is to be completed in summer 2017. In addition, the airline is assessing the possibility of equipping its A319 and A321 aircraft with this technical improvement in the course of 2017.

Retrofitting aircraft with vortex generators is another example that shows how economy and ecology go hand in hand for many measures. With this project, the Lufthansa Group makes progress in active noise protection and lessens the noise burden on people close to airports. On the other hand, there is a positive economic effect as, for example, noise-related fees at Frankfurt Airport are reduced. In an environment with intensified competition, the economic efficiency of such measures will increasingly gain importance.



The Lufthansa Group has been actively committed to noise research for many years.



#### **Participation in noise research**

The Lufthansa Group has been committed to noise research for many years, which helps create the foundations for successful measures in active noise protection. Only these involved and highly complex research and development projects lead to quieter aircraft and engine generations as well as the desired optimizations of the existing fleet. For the Lufthansa Group it is therefore very important to continue this ongoing cycle of intensive research as well as new technologies and products to obtain further efficiency increases in the performance of aircraft and engines. Continuous exchanges between research partners also contribute to reaching this goal. For this purpose, representatives of the Lufthansa Group presented the Company's activities and projects at the 4th International Conference on Active Noise Abatement ICANA 2016 in Frankfurt.

#### **Optimized approach and departure procedures**

Apart from developing new technologies, research is also focused on further optimizing current navigation procedures. The Lufthansa Group is active in numerous ways in this area, for example with the AAL trials (Augmented Approaches to Land) that began in 2015 and were part of the SESAR program (Single European Sky ATM Research, see page 36 ff., Fuel consumption and emissions). The interdisciplinary AAL project, which was one of the most ambitious research projects in Europe, comprised 15 system partners from the aviation industry, including airlines, aircraft manufacturers, the

airports in Frankfurt, Zurich and Bremen as well as German and Swiss air traffic control and the German Aerospace Center (DLR). The project's objective was to demonstrate the advantages of different approach procedures at airports of varying sizes. For this purpose, the participating airlines conducted more than 360 test flights, of which Lufthansa and SWISS flew the largest part with specifically modified A320 aircraft and standard-equipped A380 and Boeing 747-8 aircraft. The project group's goal was to test the DLR's research results in an operational setting. On this basis, the research partners were able to demonstrate that modern satellite navigation in combination with advanced approach procedures can produce economic and ecological advantages. To ensure safety, all procedures were tested and validated repeatedly in advance at Airbus or Lufthansa Flight Training in flight simulators.

#### **Maintaining a dialogue with people close to airports**

For many years, the Lufthansa Group has maintained an open, intensive and neighborly exchange with people living close to airports and their municipalities. For example, at the Frankfurt location the Group has been involved since 2008 in the "Forum Airport and Region" and was able to develop effective measures for noise protection in cooperation with the participating partners (see page 88 f., *Balance* 2013). The visible expression of this form of local dialogue is the information center at the Environment and Neighborhood House in Kelsterbach near Frankfurt. For its part, Austrian Airlines actively participates in the "Dialogforum Flughafen Wien".

## Commitment to climate research

The Lufthansa Group cooperates with partners from the areas of science and research to advance industry innovations on the basis of sound data and to further improve its own environmental management. Furthermore, the Group has been committed to climate research for more than 20 years and thus makes an important contribution to improving climate models and weather forecasts.

Commercial aircraft fly at an altitude that is of particular importance for the Earth's climate and therefore for climate research too. They also offer a high degree of continuity and in this way permit long-term observations that would be impossible and far too costly with individual flights undertaken by research aircraft.

During the reporting year, the Lufthansa Group had three aircraft in operation that are equipped with specialized measuring instruments and able to measure atmospheric trace substances and cloud particles on a global basis. The data recorded are read out after each landing, processed and analyzed by research institutions.

One of these long-haul aircraft, the Airbus A340-600 "Leverkusen", carries equipment for the project CARIBIC (Civil Aircraft for the Regular Investigation of the atmosphere Based on an Instrument Container). Two further long-haul aircraft flew every day of 2016 in the service of the climate research project IAGOS (In-service Aircraft for a Global Observing System).



Climate research on scheduled flights



### IAGOS: Setting up a worldwide research infrastructure

In 2011, Lufthansa was the first airline worldwide to participate in the IAGOS project initiated by the research institute Forschungszentrum Jülich (see page 61, *Balance* 2016). In 2015, the Lufthansa Group expanded its commitment for this novel type of long-term research of the Earth's atmosphere by means of scheduled flights and equipped a second aircraft with specialized measuring instruments. Currently, five more airlines support this scientific large-scale project aimed at setting up a worldwide research infrastructure. In 2016, it was honored as an outstanding infrastructure project by the European Strategy Forum on Research Infrastructures (ESFRI).

Among the equipment operated on IAGOS aircraft are instruments for measuring the properties of ice crystals and water vapor. This allows insights into the global characteristics of high-altitude ice clouds – also called cirrus – whose deduction until now had only been possible by means of flights with research aircraft. The IAGOS analyses also allow researchers to compare cloud observations made by satellites with direct measurements at a scope not possible before; in this way, satellite products used in applications such as weather forecasts can be improved over the long-term.

[www.iagos.org](http://www.iagos.org)

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

# PRODUCT RESPONSIBILITY



## Strategy and management

Offering a premium product is of fundamental importance for the Lufthansa Group's business success. The objective is therefore to further increase customer satisfaction and primarily to implement measures for the safety and health of passengers, flight crews and employees. This includes the protection of personal data. In this way, the aviation group aims at always being its customers' first choice.

For the Lufthansa Group, product responsibility means above all optimizing the different services along the travel chain on a continuous basis and to make flying in all its facets a sustainably positive experience (see page 68 f., *Balance 2016*, Sustainability in all phases of the travel experience). In 2016, the aviation group introduced additional programs and services aimed at further improving the travel experience and thus also customer satisfaction. Concrete goals concerning customer satisfaction are also included in calculating the variable remuneration of the members of the Executive Board by means of a system of ratios (see page 80, Annual Report 2016).

### Customer centricity and quality focus

"Customer centricity and quality focus" is one of the seven action areas of the Lufthansa Group's strategic program "7to1 – Our Way Forward". These fundamental tenets serve the purpose of securing the Group's long-term success and value creation ability. The central importance of "Customer centricity and quality focus" was again confirmed during the reporting year by stakeholders and management, as the materiality matrix and materiality analysis show (see page 22 f., *Balance 2016*, and page 20 f., Corporate Responsibility: Action areas and goals). The focus has been placed on further enhancing the Lufthansa Group brands and the related brand promises. An additional goal is to understand customer needs even better and to identify and realize optimization potentials on a continuous basis.

#### Systematic determination of customer satisfaction

To learn as much as possible about their customers as well as their wishes and expectations, the Lufthansa Group's airlines conduct regular surveys. Thanks to these worldwide opinion polls, possible approaches can be identified to improve customer orientation continuously and to secure the Company's long-term success. The further development of the feedback management process also contributes to this evolution.

At the same time, the respective departments responsible make use of satisfaction values to pinpoint the strengths and weaknesses in quality perceived by passengers and to implement concrete improvement measures on this basis. In this way the Lufthansa Group is able to check to what extent customers honor adaptations, improvements and innovations related to products as well as new services.

The three hub airlines Lufthansa, SWISS and Austrian Airlines determine continuously how satisfied passengers are with the different offers along the travel chain. This is done daily by means of online surveys that are representative for each airline's passenger volume and route network. Evaluations of individual products and services are compiled by the airlines into satisfaction indices for onboard and ground products. In addition, they calculate an overall satisfaction index on this basis.

In the past, Lufthansa, SWISS and Austrian Airlines pursued their own approaches for measuring their passengers' satisfaction. In 2016, however, they launched a project aimed at harmonizing these different paths and introducing a standardized and comparable measuring method in 2017.



**THREE QUESTIONS FOR: STEFFEN HARBARTH**  
*CHIEF COMMERCIAL OFFICER HUB MUNICH & SENIOR  
VICE PRESIDENT MARKETING COMMUNICATION  
LH GROUP AIRLINES, RESPONSIBLE FOR THE ACTION  
AREA "CUSTOMER CENTRICITY AND QUALITY FOCUS"*

**The Lufthansa Group's airlines intend to further improve their passengers' travel experience as well as their satisfaction. What is important in this context?**

Excellent customer service and resulting from that a high level of customer satisfaction are based on consistent processes and a well-developed sense of service-mindedness. It is also important that the Group airlines live up to their brand promises. To continue to be a customer's first choice, we will need to think even more strongly from the customer's position, recognize trends and needs early on and develop corresponding services.

**A key word is digitalization: What role will personalized services play in the future?**

Personalized pitches are getting more and more important for a service provider such as the Lufthansa Group. To view our own processes and products more from a customer perspective we launched the program SMILE some time ago. With the personalized products and services developed in the framework of SMILE, we serve not only changed customer needs, but we also create sustainable added value for those needs. We would like to provide our passengers with individually tailored offers concerning destinations and travel periods – assuming their assent. This also applies to additional services, such as seat reservations, upgrades, rental cars and hotels. By implication this means that we will not address offers to customers that are not relevant for them.

**What are the areas of emphasis in the SMILE program in 2017?**

An important point will be to roll out SMILE to the hub airlines and other digitalization programs within the Lufthansa Group. In addition, during the next phase of SMILE we want to further expand our analytical infrastructure and industrialize our models. This means that we will work in an automated mode in the future. By doing so, we want to allow real-time decisions for our Company.

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**Net Promoter Score**

In parallel to the online surveys, since 2014 Lufthansa, SWISS and Austrian Airlines have determined the Net Promoter Score (NPS®)<sup>1</sup> which places the focus on the travel experience as the airlines' central product or service category. For this purpose, the airlines continuously survey their customers to find out if they would recommend the respective airlines to friends and acquaintances based on their travel experience. From the share of enthusiastic passengers the share of less enthusiastic ones is deducted. Top management receives a monthly report on how the NPS® developed at the individual airlines and at the Group airlines overall. Lufthansa Cargo and LSG Sky Chefs also determine the NPS®. The Lufthansa Group is planning to introduce a harmonized method for NPS® measurements in the course of 2017 at the three hub airlines. The Company is standardizing the measurements of customer satisfaction and NPS® with the goal of increasing, or at least maintaining, the respective values, based on concrete objectives.

**New programs and services**

In 2016, the Group again introduced additional programs and services aimed at further improving the travel experience, comfort and thus customer satisfaction too.

**More comfort for passengers**

The continuous modernization of the Group's fleet (see page 28 ff., Fleet development) makes an important contribution to meeting this goal. The best example for this approach is the new Lufthansa Airbus A350-900: Thanks to its wider cabin, passengers have more room and an agreeable experience of generous space. Furthermore, the characteristics of the A350-900's construction lead to a pleasant level of air pressure in the cabin at cruising altitude, so that passengers arrive more rested. The new light concept also makes a contribution to restful travel. Aboard its most modern and environmentally friendly long-haul aircraft, Lufthansa is the first airline worldwide to use different light mood settings with the aim of affecting passengers' natural day and night rhythms as little as possible. In addition, Lufthansa takes advantage of light settings to create a pleasant restaurant atmosphere during meal services on board. After the A350-900, the airline plans to retrofit its Boeing 747-8 aircraft in the same way.

<sup>1</sup> NPS® - Net Promoter Score, a registered service mark of Bain & Co., Inc., Fred Reichheld and Satmetrix Systems, Inc.

Customer centricity and quality focus are of central importance for the Lufthansa Group.



### SMILE

Concurrently, since 2014 the Lufthansa Group has been working in the project SMILE on making communications with customers along the entire travel chain as personalized as possible and to offer added value in this way (see page 14, *Balance 2015*, Digital innovations for a perfect travel experience). Thanks to SMILE, passengers receive tailor-made flight offers, travel information as well as offers for additional services and options – all in real-time via digital communication channels. These personalized service improvements make an important contribution to deepening customer relationships and increasing customer trust.

SMILE is only one example of how actively the Lufthansa Group has pursued its “7to1” action area “Customer centricity and quality focus”. The strategy is based on innovative approaches and technologies that give a face to the IT terms of big data, analytics and open innovation. At the same time, such projects make an important contribution to advancing the digital transformation of the entire Lufthansa Group. Like Lufthansa, the other two hub airlines have already introduced numerous personalized services. Many insights that Lufthansa has gained in introducing such innovations have been incorporated into the implementation of these services at SWISS and Austrian Airlines.

### Further new digital services

Independent of SMILE, during the reporting year the Group companies introduced new digital services along the entire air travel chain that offer passengers further advantages. These include Internet access on board and new digital applications such as the inTime and Allergen apps (see page 12 f.). Such innovations are not limited to the travel experience, but begin far ahead of it.

### Sustainable improvements at SWISS and Austrian Airlines

Aiming at further emphasizing its distinctive customer focus, during the reporting year Swiss International Air Lines adopted a new brand image centered on the claim “Made of Switzerland”. The new claim comprises the most important characteristics that define SWISS as a brand: “Swissness”, emotionality and strong customer orientation (see page 45, Annual Report 2016). Furthermore, SWISS opened three new lounges in Terminal E at Zurich Airport that offer long-haul passengers an entirely new kind of comfort on an overall surface of 3,300 square meters, featuring modern SWISS design. These lounges were constructed by local companies and meet current standards concerning water and electricity consumption. Moreover, the new lounges in Terminal A and the Terminal in the Terminal will be constructed in the course of 2017 in adherence to these technology standards.

Simultaneously, SWISS works continuously on making passengers’ actual flight experience increasingly sustainable. For example, during the reporting year the airline replaced disposable packaging for economy meals on medium-haul flights with reusable bento boxes. This reduces waste quantities and thus increases customers’ and crews’ satisfaction. Since 2016, all vegetarian meals served aboard SWISS flights have been developed by Hiltl in Zurich, the world’s oldest vegetarian restaurant. And SWISS had the summer collection of amenity kits for Business Class manufactured from 100 percent recycled PET bottles.

Austrian Airlines now uses environmentally friendly packaging made from cornstarch flour, for hot meals on selected flights.



## CO<sub>2</sub> COMPENSATION

Passengers of the Lufthansa Group may compensate the CO<sub>2</sub> emissions unavoidably associated with their journeys by making a donation and thus a personal contribution to climate protection. Compensations are made through respected agencies that apply the most stringent standards in selecting and implementing the projects they support (see page 67, *Balance* 2016). Offering voluntary CO<sub>2</sub> compensation is an established part of the aviation industry's four-pillar strategy for climate protection (see page 40 ff.) and the Lufthansa Group's environmental strategy 2020. In 2016, Lufthansa Group customers again took advantage of the option to travel in a climate-neutral way.

The quantity of CO<sub>2</sub> emissions that passengers of the hub airlines Lufthansa, SWISS and Austrian Airlines as well as AirPlus customers compensated during the reporting year added up to 23,900 tonnes of carbon dioxide. Thus, donations of more than 355,000 euros were received for climate protection projects. The CO<sub>2</sub> compensation payments made by customers are channeled to certified climate protection projects in whose context climate-damaging energy sources are replaced with climate-friendly ones. Over the last five years alone, about 2.1 million euros were invested in such climate protection projects in this way. To make even more customers aware of the option of a voluntary CO<sub>2</sub> compensation, the Lufthansa Group is planning to further optimize its related Internet offer.

## Flight safety and health protection

The health and safety of passengers, crews and employees have the highest priority for the Lufthansa Group. To implement this fundamental concern without compromise, all Group airlines have comprehensive safety management systems. Furthermore, the aviation group is a world leader in researching the quality of cabin air.

### Flight safety

The safety management system includes comprehensive monitoring of flight operations: The Group airlines' experts track performance ratios, carry out audits and inspections, evaluate risks, analyze flight data and investigate incidents. All these measures serve the purpose of identifying and steering safety-relevant trends at an early stage, achieving target values and guarding against possible undesirable developments. Beyond the legally required reporting systems, Lufthansa operates a low-threshold confidential reporting system that is open to all employees.

### Standards and guidelines

With regard to their safety management systems, the Lufthansa Group's airlines take their bearings from legal requirements such as EU guidelines, as well as regulations issued by the European Aviation Safety Agency (EASA) and the U.S. Federal Aviation Administration (FAA). In addition, the airlines of the Lufthansa Group fulfill all standards and recommendations of the International Civil Aviation Organization (ICAO). Every two years, independent experts audit the safety standards applied Group-wide in an IATA Operational Safety Audit (IOSA). All Group airlines fully apply the internationally accepted IATA standards for air safety. These external benchmarks are supplemented by the Lufthansa Group with internal guidelines, in particular the Executive Board's Safety Commitment. All guidelines are compiled in the aviation group's Safety Management Manual and are additionally included in handbooks concerning flight operations, training, maintenance and ground-handling services.

### Organization

At every Group airline, the safety management system is the responsibility of a safety manager. The safety manager reports both to the airline's management and to the Group Safety Pilot, who has Group-wide responsibility for evaluating and developing procedures and standards relevant to flight safety. He reports directly to the Chairman of the Executive Board and CEO of Deutsche Lufthansa AG, Carsten Spohr.

### Areas of emphasis in 2016

In 2016, the participants completed the research project “SaMSys – Safety Management System for the Improvement of Flight Safety”, which is supported by Germany’s Federal Ministry for Economics and Technology and headed by the Lufthansa Flight Safety Department in Frankfurt. The scientific insights from this project led to an expansion of the scope of training at Lufthansa and had an influence on new recruitment processes. Another area of focus was the standardization of selection and training benchmarks for Lufthansa Group pilots at a high level. In 2017, the Group will concentrate on adapting its safety structures to the new internal matrix organization.

### Cabin air quality

For many years, the Lufthansa Group has actively cooperated with investigations of so-called smell events aboard aircraft. Together with national and international authorities, associations, research institutes and manufacturers, the aviation company supports research concerning the composition of cabin air and its effect on the human body. In 2012, the Lufthansa Group set up its Cabin Air Quality Review Board, whose members represent Flight Operations, the Medical Service, Lufthansa Technik, Technical Operations Management and Group Job Safety.

### EASA study confirms good air quality

On March 23, 2017, the European Aviation Safety Agency presented its final report concerning a study of cabin air quality aboard commercial wide-body aircraft. In it, EASA again reached the conclusion that there is no verifiable correlation between cabin air and health problems. In fact, the air quality on measuring flights was comparable to that in normal indoor spaces such as classrooms or offices. Earlier series of measurements had reached the same conclusion (see page 71, *Balance* 2016).

In the context of the EASA study, the Fraunhofer Institute for Toxicology and Experimental Medicine (ITEM) and the Hanover Medical School (MHH), together with the Lufthansa Group, Condor and British Airways, analyzed air samples from cockpits and cabins, which had been taken on 69 measuring flights on eight different aircraft and engine types. On these flights, neither the thresholds for harmful substances were exceeded, nor were substances found in concentrations hazardous to health. While minuscule quantities of TCP (tricresyl phosphate) were occasionally detected by the sensors on all aircraft types at the nano scale, the neurotoxic ortho-tricresyl phosphate (oTCP) was never found.

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## GERMANWINGS FLIGHT 4U9525

Flight safety is always the first priority for the Lufthansa Group. Therefore, the Group airlines implemented numerous measures to improve flight safety in the immediate phase after the Germanwings accident on March 24, 2015 (see pages 70 and 74 f., *Balance* 2016). Similarly, the Group combined all tasks concerning the follow-up of the crash of flight 4U9525 and the comprehensive care for relatives in the so-called Post Emergency Organization (PEO). For relatives, an ongoing offer of psychological care and psychosocial support was available in 2016 as well.

With the goal of supporting projects, initiatives and proposals from relatives and other affected groups in memory of the victims, Lufthansa set up an aid fund in 2015, endowed with 15 million euros. In this fund, Germanwings and Lufthansa have combined their voluntary and long-term commitment following the accident (see page 74, *Balance* 2016). During the reporting year, projects and initiatives were supported with 6.9 million euros from the fund, allocated according to binding criteria. In addition, it has been important for Lufthansa and Germanwings from the beginning that young people who have lost one or both parents in the accident should be able to complete a school education, professional training or university studies that correspond to their personal preferences and abilities. For this reason, Lufthansa decided that they receive voluntary payments from the aid fund, depending on age and whether they lost one or both parents, independent of compensation claims. A total of more than 5 million euros are available for this purpose, of which a large part has already been paid out.

On March 24, 2017, a sculpture commemorating the victims was unveiled in Le Vernet in the French Alps. At a memorial ceremony that marked the accident’s second anniversary and in which more than 500 relatives from around the world participated, Carsten Spohr, Chairman of the Executive Board of Deutsche Lufthansa AG, handed over the “Sun Sphere”, created by German artist Jürgen Batscheider, to the bereaved families.



Forever in our memories

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### Additional filters being tested

Independently of these studies, the Lufthansa Group carries out its own procedural tests and technical adaptations. This commitment includes the installation of special HEPA/carbon filters, for example. These cabin air recirculation filters are equipped with an additional layer of activated carbon and are intended to further increase cabin air quality by removing volatile substances and compounds from recirculated air more quickly. After initial tests on three Lufthansa Airbus A321s, the Group has extended the trial phase to Germanwings A320s and all Lufthansa A321s, and complemented it with scientific monitoring. If the filters' performance turns out convincingly, the Lufthansa Group will install them on additional aircraft.

### Transparent communications

The Lufthansa Group reports comprehensively about the topic of cabin air quality in internal and external media. In addition, at several Company locations experts from relevant Group departments inform flying personnel and technicians about measuring and research results, technical analyses and innovations. Furthermore, the Group is planning to introduce a web-based training (WBT) for crews on the topic of cabin air.

## Data protection and data security

The careful, confidential and secure handling of personal data of customers, employees and shareholders has always been the first priority for the Lufthansa Group. It is the basis for trustworthy business relationships and a prerequisite for the Company's long-term success. The Lufthansa Group protects and secures data according to the highest standards.

The Corporate Data Protection department ensures that Germany's Federal Data Protection Act (FDPA) is applied across the Lufthansa Group. It familiarizes employees with the relevant legal provisions and conducts regular data protection audits. In addition, the Group's data protection experts advise departments when new systems are introduced and procedures are designed or modified. A central objective is to make employees and managers aware and thus enable them to identify and avoid data protection risks. As in the preceding year, the focus of consulting during the reporting year remained on the use of customer data in conformity with data protection standards. Another area of emphasis was on providing information and advice on the EU General Data Protection Regulation, which will come into full effect on May 25, 2018 after a two-year transition period for all corporations in the legal sphere of the European Union or the European Economic Area (EEA).

### Guidelines and organizational foundations

The framework for secure data handling within the Lufthansa Group is defined by its Data Protection Guideline, which is based on laws such as the FDPA and established principles of data protection. It also specifies rules that ensure conduct in conformity with data protection standards across the entire Group, and that make data protection risks transparent and guard against them. The guideline also comprises regulations concerning responsibility for data protection in countries outside the EU and requirements with regard to implementing third-party data processing.

Data protection is the responsibility of the Executive Board member responsible for Finance and Aviation Services of Deutsche Lufthansa AG and the management of the respective Group company. In assuming this responsibility, they are supported by the Corporate Data Protection department. All companies that are required by law to appoint a data protection commissioner have done so.

Furthermore, the Lufthansa Group has established a notification process for data protection and data security incidents. Complaints and information requests from concerned parties are processed in a timely and comprehensive manner within internally set deadlines. As in 2015, the Lufthansa Group did not record a registrable infringement against data protection in 2016, according to FDPA rules.

### Targeted training

Training and informational measures concerning data protection are aimed at familiarizing employees and managers with the necessity of data protection, the key terms, the organization of data protection within the Lufthansa Group, and specific issues concerning individual areas. The web-based training course "The fundamentals of data protection" is mandatory for many Lufthansa employees and must be completed every three years. In addition, the Group offers specialized online trainings for certain target audiences (see page 72, *Balance* 2016).

### International data protection regulations

Data protection regulations in other countries play an increasing role for the Lufthansa Group due to its international operations. Conflicts arise in the airline industry in particular because foreign authorities increasingly request passenger data. However, providing such data would often be contrary to European data protection rules (see page 67, *Balance* 2015). In 2016, there were also some legal changes with regard to data protection and data security that affect the Lufthansa Group:

The Lufthansa Group applies the most stringent standards to data protection and data security.

### EU-US Privacy Shield

After the European Court of Justice (ECJ) declared the Safe Harbor Agreement between the EU and the USA concerning the exchange of personal data to be invalid, the draft for a new agreement “EU-US Privacy Shield” concerning data transfers between the EU and the USA was presented on February 2, 2016 (see page 73, *Balance* 2016). In June 2016, the EU-US Privacy Shield was ratified and can now be applied, provided US companies conform to these new rules. As a further instrument, data transfers to the USA in conformity with current law – the so-called Standard Contractual Clauses – are available, and have to be signed by senders and recipients of data.

### New EU General Data Protection Regulation

The European Parliament adopted the new EU General Data Protection Regulation on April 14, 2016, which will come into effect on May 25, 2018 (see page 73, *Balance* 2016). The Lufthansa Group will adapt its existing data protection management system to this Europe-wide standardized data protection law. Nevertheless, individual national deviations from this norm will continue to be in application for the aviation group, such as those concerning the obligations to appoint data protection commissioners and with regard to employee data protection.

Simultaneously with the General Data Protection Regulation, the introduction of EU-wide regulations for transmitting Passenger Name Record (PNR) data for flights outside the European Union and optionally for flights within the EU to so-called Passenger Information Units in the 28 Member States was set for 2018 at the latest. Germany’s federal parliament adopted the corresponding law at the end of April 2017, allowing implementation at the national level. For airlines this means above all more complex reservation and check-in processes.

### IT Security

The Lufthansa Group department IT Strategy & Security is responsible for implementing requirements concerning data protection and IT security. This includes the development of appropriate concepts and measures such as e-mail encryption, cyber crime prevention, and protection from criminal activity over the Internet.

The Lufthansa Group’s information security policy is regulated on three levels: The Group Information Security Guideline is concerned in a comprehensive way with the protection of processes related to information processing and storage. On the subsequent level, a framework describes the Group’s information security management including the requirements on its implementations within Group companies. And third, detailed guidelines outline IT security aspects concerning specific topic areas, products, locations and target groups.



### PROTECT campaign as focus in 2016

Like many other companies, the Lufthansa Group is a permanent target for different cyber-attack scenarios. These include attempted theft from mileage accounts of the frequent flyer and premium program Miles & More, attacks on the availability of the Group’s presence on the Internet and an increasing number of commercially motivated attempts at fraud. Therefore, the Lufthansa Group is reinforcing its activities in all areas to identify, combat and guard against criminal activity on the Internet.

For example, the IT department launched PROTECT in the fall of 2016; a comprehensive program aimed at increasing the Group’s cyber resistance. This includes process optimizations and investments in technology. Among the program’s first building blocks was a cyber crime prevention and awareness campaign. Its objective was to demonstrate to employees and managers how far-reaching their personal responsibility is in supporting the Lufthansa Group in its protection against cyber crime. The Group is only able to guarantee the protection of business and customer data when all employees act in a security-aware manner to complement technical measures. As Lufthansa Group managers have a particular role in this context, security training with personal participation was conducted specifically for this target group. In addition, employees are continuously informed about IT security issues in the Group’s internal media, by means of a Cybercrime Prevention Newsletter or quiz-based games.

Furthermore, the Lufthansa Group launched a bug bounty program at the beginning of 2017, aimed at identifying and removing security vulnerabilities in IT systems with help from invited hackers and research centers. The goal is to further improve the protection of customer data.

# SOCIAL RESPONSIBILITY



## Strategy and management

At the end of 2016, the Lufthansa Group employed 124,306 staff worldwide, more than 68,000 of whom worked in Germany. Their know-how and wide-ranging talents are a significant success factor for the aviation group. As a socially responsible employer, the Lufthansa Group supports its employees with an attractive work environment as well as transparent structures and processes.

Working at the Lufthansa Group has many facets. But the focus is always on people. The Group aims at being the first choice for shareholders and customers, and in particular wants to be the first choice in aviation for existing and new employees. To create an attractive and need-oriented work environment, the Lufthansa Group counts on a self-motivated and trust-based work culture in tandem with modern information technology.

### Attractiveness as an employer

In the materiality analysis carried out in 2016, stakeholders and top management confirmed the action area “Attractive employer” as being very important. The decisive factors in this context are: relations between employer and employees based on fairness and partnership, high social standards (see page 68 f.) as well as offers for a balance between work and private life (see page 67). In addition, the Lufthansa Group counts on a broad spectrum of training and continuing education options (see page 70 f.) and comprehensive health management to maintain the employees’ health and ability to perform (see page 72 f.).

Equally, diversity and equal opportunities are among the aviation group’s central principles. For a service company with global activities and an international clientele such as the Lufthansa Group, promoting diversity among its employees continues to gain importance (see page 63 ff.). This also includes increasing the share of women on all management levels at a continuous pace.

The aviation group is actively involved in these topics to ensure that it will find suitable employees in the future and to secure the long-term employability of current staff members. Furthermore, social megatrends and developments – such as digitalization, globalization and diversification of life and work-time models (see page 6 ff., *Balance 2016*, Changing working environment) – demand not only continuously increasing levels of flexibility, but also new competencies in work areas with high demand in the future. To increase the latter, the Lufthansa Group implemented an organizational restructuring that took effect on January 1, 2016. Taking the role of active sparring partners, the personnel departments at the Group companies accompany and support the Lufthansa Group’s current transformation process into an agile, process-oriented matrix organization.

### Core topics “Culture and leadership”

As far back as 2012, the aviation company implemented specific initiatives and effective measures to change both corporate culture and management culture across business segments. In July 2014, the Lufthansa Group introduced the strategic program “7to1 – Our Way Forward”, whose action area “Culture and leadership” has been an area of emphasis in HR management. The focus on “Culture and leadership” takes one consideration into account above all. In an increasingly volatile environment, highly educated and committed employees who inspire customers are indispensable for the Lufthansa Group’s sustainable business success.



Shaping the action area “Culture and leadership” was transferred to the Lufthansa School of Business during the reporting year, which at the same time evolved into the Lufthansa Group CAMPUS. Against this background, the alignment has changed from an “interdisciplinary education provider” to “driver” of culture changes at the Group. The strategic realignment results from the conviction that successful steps in the aviation industry are based on the successful change of behavior patterns. Since the end of 2016, the Lufthansa Group CAMPUS therefore offers formats for developing individual (leadership) competencies as well as those to support team development and organizational change. The Lufthansa Group CAMPUS thus takes a role in continuous and high-quality personnel development as well as in a long-term dialogue between employees and managers across the entire company. At the same time, it provides support for creating new structures and strengthening the internal culture of trust.

## Modernization of working environments

The future of professional environments is global, digital and connected. These changes are fundamental and hold both opportunities and risks. To optimally adapt working conditions for employees as well as HR processes to these developments, in 2016 the Lufthansa Group again focused on the modernization of working environments. This includes, among other measures, the optimization of HR management, for example through measures that simultaneously increase effectiveness and efficiency while decreasing costs. Currently, the HR processes across the entire Group are being harmonized in the context of the project “IT Transformation”.

The Lufthansa Group opens up further potentials by assessing development paths and proven programs for promoting junior staff members and adapting and realigning them, if needed (see page 70 f.). In addition, modern desk-sharing models such as the “New Workspace”, which was rolled out at further locations during the reporting year, promote a self-motivated and trust-based work culture. These innovative solutions make a significant contribution to securing the Group’s future viability and value-creation ability over the long-term.

## Diversity and equal opportunities

For the Lufthansa Group, diversity at management and staff levels is a fundamental prerequisite for remaining innovative and versatile. The Company has explicitly defined diversity as a strategic element that secures and expands economic success – in accordance with the interests of its employees and the social concerns of society.

Systematic diversity and the appreciation of all employees associated with it make an organization more agile, flexible and creative. Diversity Management actively includes the life situations of all employees in the entrepreneurial process and makes a significant contribution to recognizing stakeholder needs more clearly and optimizing services.

The Lufthansa Group pursues a comprehensive management approach that understands diversity in the sense of versatility, variety of ideas, blending of perspectives and strengthening of competitiveness. Diversity and equal opportunities are a significant element of the future-oriented strategy “7to1 – Our Way Forward”, where they are anchored in the action area “Culture and leadership”.

○ Welcome diversity!



The mere fact that the Group’s employees worldwide represent 144 nationalities proves the diversity desired. Beyond that, the Company already represents the core idea of diversity very well: in the differences between business segments and business models, in the differences in employees’ competencies and experiences that flow from these differences, in the international links and in the diversity among customers and employees. In addition, the objective of diversity is reflected in the philosophy of talent management as it is applied every day. Under the motto “Welcome diversity!” one objective of this leadership approach is to create a working environment in which all employees are increasingly able to shape – and should shape – their own careers within the Group according to their talents (see page 83 ff., *Balance* 2015).

### Varied goals

With its diversity-oriented personnel policy the Lufthansa Group pursues several goals. It aims at accessing the enormous potential of the existing diversity among its approximately 124,000 employees even better, and simultaneously to apply more diversity in profiles, competencies and experiences up to management levels. In doing so, it aims not only at making the Company’s organization more effective, but also at strengthening and increasing its attractiveness as an employer – above all against the backdrop of demographic change and the fact that talented young employees are not always easily found on the labor market.

## Employees in the Lufthansa Group: Key data 2016

### Employees Group

124,306

### Female employees Group

45.7%

**34.1%**  
Share of women with staff  
responsibility

**15.6%**  
Share of women in management  
positions

**5.5%**  
Share of women in  
the cockpit

### Apprentices

1,178

### Job applications

110,000

## Organizational foundations

To reach these goals, diversity and equal opportunities have long since been firmly anchored in the Group's organization. For example, among other measures the function of an equal opportunities commissioner at the Lufthansa Group has existed since 1995. Furthermore, since 2015 the working group Diversity@LHGroup has treated the topics of gender balance in management, internationality and age structure on a Group-wide level. Additionally, the Lufthansa Group launched the project "Promoting women in management" during the reporting year (see page 66, Three questions for: Simone Marshall).

## Central action areas

The Lufthansa Group approaches the task of realizing diversity and equal opportunities according to its objectives from four directions: diversity among employees and in management positions, an integrated link between work and private lives or work and family (work-life integration), intercultural competence, as well as inclusion. Activities and initiatives in each area make a contribution to achieving the goals that have been set.



## Diversity among staff and executives

Women in management positions are a matter of course at the Lufthansa Group, and their numbers are to be further increased. At the end of the reporting year, 34.1 percent of supervisors with staff responsibility worldwide were women. This is an increase by 0.2 percentage points compared with 2015. At top management level, the share of female managers worldwide reached 15.6 percent (0.7 percentage points higher than in 2015) and more than every 20th pilot was a woman (5.5 percent).

However, the Group is not content with this result. Since the middle of 2016, it has been active in the initiative "A matter for the boss"; a network of managers from business, science, the social economy, the public sector and media, who feel personally obligated to equal opportunities for men and women. The initiative aims at supporting the necessary changes in society by acting as an example and providing new concepts and approaches. Also in 2016, the Group companies Delvag Versicherungs-AG and Eurowings participated in founding the Cologne-based alliance "More women in leadership". The participating companies have set themselves the goal of jointly developing and implementing strategies for promoting women in management positions. In addition, the Group is bound by the voluntary self-set objectives of companies listed in the DAX 30 stock index to increase the share of women in management positions.



**THREE QUESTIONS FOR: SIMONE MARSHALL**  
*HEAD OF THE NEW PROJECT "PROMOTING WOMEN  
IN MANAGEMENT" DEUTSCHE LUFTHANSA AG*

**Why was this project launched?**

For a very simple reason: the number of female managers in upper-level management positions has changed too little over the last few years – despite numerous measures and increased awareness within the Company. At the moment, 85 percent of our managers are male (Leadership Circle 1-3)<sup>1</sup>. In this context, one needs to know that overall staff numbers are almost balanced, with 55 percent male and 45 percent female employees. I think this is reason enough to address the topic more intensively.

**How do you proceed and what goal do you want to achieve with this project?**

Our plan is to identify talented women Group-wide who might come into consideration for a managerial position either right away or in two to three years' time, by working together with the individual business segments. These talents are then offered personal advice and support. This might be mentoring from a female or male top manager or individual career counseling. In this way, a talent pool of young female managers is created step by step. Already, senior executives ask me directly about talents from this pool. This is exactly our goal, but also to create a pool of external female managers for key positions. As a member of the Leadership Board, my role is that of "diversity challenger" with the objective of placing at least one woman on each shortlist per management position. This works only in cooperation with personnel managers and executives. With additional measures, such as increasing the share of female new employees and trainees as well as women's support programs, we're working to increase the number of female managers by 2021.

**How do this and other Lufthansa Group projects aimed at promoting women differ?**

It is the personal and individual advice that makes the difference, in my estimation. To be a career coach for women, to establish or maintain contacts for them, is a very helpful and strengthening experience for many female junior executives. In the opposite sense, I am also the contact person for women who want a change. My work in HR Management Executives means that I have a Group-wide network of top managers who are pleased to be a mentor for a woman with potential, should the need arise. In addition to specific traineeships for women and internal women's support programs, mentoring is one of the most effective support measures we can offer our women, in my opinion.

As far back as 2014, the Lufthansa Group signed the Diversity Charter. This corporate initiative advocates the firm anchoring of diversity management at the executive level of German companies.

Internally, equal opportunity has long since been incorporated into collective agreements. The Company also specifically works on filling more management positions up to executive board level with women. The principle "Equal pay for equal performance" has been applied at the Lufthansa Group since the 1970s. Wage agreements and collective pay structures outside the agreed pay scale, which can be consulted by anyone, are proof of this principle.

The Group concretely implements the objectives and goals of the initiatives mentioned by means of various activities. For example, it has supported and accompanied female junior staff in their professional rise for many years with cross-company mentoring in multiple industries. The internal program "Go ahead" completed its third year in 2016; it is also addressed to women who aim at management positions (see page 77, *Balance* 2015).

An important topic for internal communications was "unconscious bias", a phenomenon of subconscious thinking patterns and their effects in personnel processes, for which the Group wants to raise awareness in 2017 as well. A further positive stimulus for employee diversity comes from the fact that the Company has defined new, attractive conditions in personnel policy for employees who would like to change from one Group company as employer to another. In 2015, a transparent advertising process for vacant management positions was introduced and in filling such jobs, diversity criteria are included.

<sup>1</sup> "Leadership Circles 1-3" signify the levels of senior managers at the Lufthansa Group.

Leadership can be shared, too: The Lufthansa Group offers the option of job sharing management positions.



## Work-life integration: Family-aware corporate culture

Traditional family and work models are undergoing change and new models are gaining more and more importance. Today, the focus is increasingly on work-time models that take into account changing needs in different life phases. These not only allow for a better harmony between working and family life, they also increase employees' motivation and health. The Lufthansa Group supports its employees and managers by offering flexible work-time models and provides detailed information on this subject on the intranet and in the context of various events. For example, the Company offers the options of filling managerial positions in tandem (shared leadership) or taking sabbaticals from work. In Frankfurt, Lufthansa employees have the use of two parent-child offices together with their children when there are difficulties with child care; in 2016, the Group extended this offer to its Hamburg location. Options such as the summer school vacation care program "Luftkusse" in Frankfurt and Munich, pme Familienservice at all German locations or the network Väter gGmbH ("Fathers, Inc.") were continued during the reporting year as well (see page 86 f., *Balance* 2016).

After having signed the "Charter for care" in 2015, the Lufthansa Group has further intensified its internal communications on the subject of improved compatibility of work and caring for family members.

## Inclusion

For the Lufthansa Group, employment and inclusion of people with disabilities is not only a legal obligation, but also fulfills a social responsibility and is thus an important goal of personnel policy. The Group is committed to promoting people with disabilities professionally and treating them fairly and caringly. Measures designed to include people with disabilities are discussed and advanced in regular dialogue events involving top management, HR management and representatives of the severely disabled.

At the end of 2016, the employment rate for people with disabilities at the Lufthansa Group in Germany stood at 4.3 percent. While some Group companies, such as LSG Sky Chefs, reach employment rates of more than 20 percent and thus overfulfill the legally defined minimum quota of 5 percent, the relevant employment at the passenger airlines is significantly lower due to legal requirements. Therefore, the Lufthansa Group also takes advantage of other ways of supporting people with disabilities, such as placing orders with Werkstätten für Behinderte Rhein-Main (see page 80) or the cooperation with the National Paralympic Committee Germany (DBS).

## Employment policy based on partnership

The Lufthansa Group's success depends greatly on the ideas, enthusiasm and commitment of its employees. Therefore, the aviation company attaches the greatest importance to providing its employees with an attractive work environment and appropriate salaries. Likewise, it is an established tradition always to balance the economic interests of the Company with the expectations and needs of its employees.

It is tried-and-tested Company policy to settle clashes of interests between Company management and the bodies representing employees in a transparent manner. A fair approach to coexistence in all areas creates the balance needed to advance the Lufthansa Group's position in the market. The growing plurality of opinions and opinion leaderships, much like developments in society as a whole, is increasingly a challenge for all parties concerned. The guiding principles for joint efforts are flexibility and responsiveness.

### Partnership in collective agreements

The Lufthansa Group employs its staff under conditions that guarantee them social and material security not only during but also after their working years. These are established on the basis of collective agreements that the Company negotiates with its union partners Vereinte Dienstleistungsgewerkschaft (ver.di), Vereinigung Cockpit (VC), and Unabhängige Flugbegleiter Organisation e.V. (UFO). The goal is to treat all employee groups within the Company fairly and justly – a desideratum that the multiplicity of unions within the Company presents with an array of increasingly challenging conditions. You can find the latest information on the ongoing collective bargaining negotiations at:

[www.lufthansagroup.com/media](http://www.lufthansagroup.com/media)

### Active pay and social policy abroad

Internationalization and globalization offer a broad range of opportunities for the Group's business and personnel processes. As a company with international operations, Lufthansa's pay and social policies are guided by conditions in the various countries. The focus is on the long-term definition of the conditions of employment, which depend on the needs of the employees, operational requirements, and the local labor market – with the inclusion of

compensation rules, working conditions, and pension schemes. Lufthansa defines these agreements in cooperation with internal labor committees and employees. The Company is a party to collective wage bargaining with employees in about 25 countries. In all countries where Lufthansa acts unilaterally, the Company uses benchmarks and macroeconomic data such as inflation figures to review salaries usually once a year on the basis of market and competitiveness criteria. In countries with very high rates of inflation, this assessment is performed more often, given the circumstances, and usually leads to pay increases. In this way the Lufthansa Group offers continual review and adjustment of working conditions for its locally employed staff. As a signatory to the UN Global Compact, Lufthansa has documented its support for freedom of association and the right to collective bargaining for all of its employees worldwide (see page 26). Employees in any country where Lufthansa companies are active are free to lawfully organize themselves and become involved in defining their working conditions.

### New system for Company pension scheme

There has been an attractive Company pension scheme for Lufthansa employees since 1994. The aviation group attaches great importance to rewarding the performance of its employees in this additional way. In order to respond to the developments on the capital markets as well as the consequences of demographic change, the Group terminated the bargaining agreement with employees regarding the Lufthansa pension plan in September 2013. The goal was and remains to agree with the different collective bargaining partners on modern, market-oriented retirement benefits that sustainably secure the Company's competitiveness.

### **Collective agreement concluded with ver.di trade union in Germany**

On January 1, 2016, the new collective agreement "Lufthansa Pension Ground" took effect for the approximately 30,000 ground staff in Germany employed by Lufthansa, Lufthansa Cargo, Lufthansa Technik and LSG Sky Chefs. The proposed new system provides fundamentally that in the future Lufthansa will pay contributions for each employee into an individual capital account (defined contribution system) and invest these funds on the capital market instead of guaranteeing pension levels (defined benefit system). Lufthansa pays 5.2 percent of the qualifying salary into a personal pension account under this format. As a rule, existing employees covered by collective agreements receive a transition-related and age-dependent contribution with a guaranteed fixed interest rate of 3.5 percent per year. Furthermore, these employees have the option of also receiving a contribution of 5.2 percent that will then be invested on the capital market. Lufthansa guarantees that at least the sum of the contributions paid in will be disbursed when pension payments begin. In addition, each employee has the option of further increasing the level of his or her Company pension by means of gross salary conversions. All pension entitlements previously earned under the Company pension scheme remain unchanged in any case.

### **"involve me!": Employee commitment counts**

Regular employee surveys have for a long time been an important instrument for the Lufthansa Group to measure employee commitment, identify action fields and initiate change where needed (see page 82, *Balance* 2015).

"involve me!" is the name of the survey launched in 2015 and carried out every two years in a standardized format across the Group. It allows management to make a direct comparison of data from individual Group companies and initiate a transparent, Group-wide dialogue. The survey also serves as basis for the calculation of the "Engagement Index" (EI). This ratio was introduced by the Executive Board in 2016 and indicates to which degree employees feel committed to the Company and to which degree they are willing to lend their support to their employer (see page 90, *Balance* 2016). The EI is based on input analogous to German school grades and includes the components "Say" (willingness to recommend), "Stay" (commitment to the Company) and "Strive" (willingness). A high level of commitment follows from positive responses to these three components.

As a performance ratio, the EI is anchored in the Group's strategy. It is important for the Lufthansa Group to keep this ratio current and to feed the messages associated with its value into guiding the Company on a continuous basis. In years without a complete "involve me!" survey the Executive Board calls for a "quick check", which is limited to those questions with relevance for determining the EI. For 2016 this short form of the survey resulted in an EI value of 2.4, after 2.3 in the preceding year. The external reference value or benchmark is currently 2.2. Even though the EI declined slightly compared with 2015, it can be called stable against the background of the current restructuring process taking place within the Lufthansa Group. From 2018 the EI is anticipated to improve annually and reach the level of the external benchmark in 2020.

The Lufthansa Group is aware of the fact that merely measuring employee commitment is not enough. The greatest challenge comes after the survey is completed: Progress can only be achieved if concrete measures are derived from the survey results and employees can thus see that the Company takes their responses seriously. In 2016, the Group increased the number of its dialogue events, and initiatives related to issues of corporate culture and interdisciplinary teams. One example in this area is "culture4growth", a program launched at Austrian Airlines in 2016.

In addition to determining the Engagement Index, the Lufthansa Group again calculated the Leadership Index (LI) in 2016 from data collected through "involve me!". The LI is directed by the Group's five Leadership Principles (see page 73, *Balance* 2015). For the reporting year, the LI remained unchanged from the previous year at 2.2 and is thus better than the external benchmark of 2.5.

### **Program for professional reorientation**

In 2013, the Lufthansa Group set up a program for professional reorientation. It continues to address employees who seek new professional challenges within or outside the Group or who would like to become self-employed. The program thus makes an important contribution to shaping staff adaptation processes in socially compatible ways. Since the program's launch, more than 1,500 employees have already used its confidential career counseling services. It consists of various service modules, including comprehensive counseling concerning professional reorientation, active accompaniment by counselors throughout the application process as well as a Company-related job exchange. The content of the program was updated in 2016 and has been made available across the entire Lufthansa Group in a need-oriented manner since 2017.

## Talent management

For many years, the Lufthansa Group has attained top positions in renowned employer rankings. The fascination for jobs within the aviation group is unabated, as is demand with about 110,000 applications in the reporting year. Talent management has a central role in finding qualified and motivated employees and retaining them at the Group.

The Lufthansa Group is planning to hire more than 3,000 new employees in 2017, including 1,400 flight attendants for the Frankfurt and Munich hubs.

Those interested can find paths into the Group's working world via the award-winning career portal [Be-Lufthansa.com](http://Be-Lufthansa.com) (see page 9, *Balance* 2016) or via [www.lufthansa-flugbegleiter.de](http://www.lufthansa-flugbegleiter.de). To identify appropriate applicants for jobs in the cabin, the Lufthansa Group now uses flight attendant castings as a new format. Since the first casting in 2016 in Munich, about 2,750 applicants have participated in this process. Subsequently, 450 future flight attendants have begun their training at the Lufthansa Group or completed it (as of January 2017).

Managers, employees and new hires benefit from the Group's comprehensive training and continuing education offers (see page 6 ff., *Balance* 2016, Changing working environment). In the reporting year, the Lufthansa Group offered more than 45 different entry options for high school and university graduates. At the end of the reporting year, 1,178 people were employed in the Lufthansa Group's 27 training-based professions.

An apprentice training to be a surface coating technician at Lufthansa Technik.



### Finding and binding talents

The employees' talents, competencies and know-how are the foundation for the Lufthansa Group's success. To ensure that employees can apply their abilities optimally, the Group counts on a corporate culture based on partnership, which is characterized by transparency, tolerance, diversity and respect in dealing with each other. Talent management serves as a central human resource action area in this context – also with regard to training and continuing education.

The philosophy of talent management comprises nine core messages and is borne by the guiding motto "Every employee has talent!" (see page 91, *Balance* 2016). The Lufthansa Group also applies a comprehensive diversity approach in this area. Thus, it is a particular concern for the Company to promote the career development of female employees, for example by offering appropriate support or mentoring programs (see page 66, Three questions for: Simone Marshall).

### Attractive employer

The Lufthansa Group aims at remaining an attractive employer and increasing its attractiveness for external talents on a continuous basis. In this context, talent management is of decisive importance for finding suitable personnel for all management and employee levels (see page 61 f., Strategy and management), counteracting the increasing lack of qualified personnel and ensuring the availability of required competencies within the Company. The aviation group therefore develops a strategic talent pipeline which serves to increase its competitiveness, in particular in the competition for external talents.

To reach its goals, the Lufthansa Group piloted three new formats for talent management in 2016. The visibility platform Spotlight on Talent is focused across business sections on internal talents in specific job families that are in high demand and will continue to gain importance, such as finance and IT. Via the TalentHub, the

second new format, the Group remains in contact with external talents more easily – for example with former interns who convinced with exceptional performance. The primary target group is job beginners and young professionals, who are an additional recruiting resource for jobs filled by external applicants. The third new format is the Alumni Network, which gives former employees the opportunity to remain in contact with the Lufthansa Group and to position themselves for possible reentry via job offers.

Among the tried-and-tested talent management formats are the Junior Round Table, an onboarding program for academic job beginners, and the trainee program ProTeam. Both serve to retain exceptional personalities at the Company, as they contribute to the latter's ability to innovate and be competitive.

In 2016, the Lufthansa Group extended the standardized performance and talent assessment instrument "Profile" to about 1,600 employees not covered by collective agreements. Overall, more than 5,000 employees were assessed with standardized tools during the reporting year. Managers play a central role in this context as they give increasing attention to developing and promoting talents, following the core message "Fostering Talent". To follow this new path consistently, the Lufthansa Group replaced the previous competency model with the Leadership Principles (see page 91, *Balance* 2016) and introduced talent clusters, which ensure the standardized and objective development of all employees covered.

The new format "TalentHub" allows the Lufthansa Group to more easily keep in contact with external talents.



## Shaping the future

The Lufthansa Group adapts to social changes in a continuous and flexible process. This objective is also taken into account by the Group's trainee programs. Against the background of increasing digitalization (see page 4 ff., cover story #DigitalAviation), the "Pro-Team" applicants for the IT area are to be addressed and selected in a more targeted manner in 2017. The Lufthansa Group also plans to further expand the cooperation between different trainee programs. Another goal is to promote the spirit of an internal community even more strongly and to support employees in creating self-organized networks.



## TO DEVELOP EMPLOYEE POTENTIALS THROUGH 360° FEEDBACK

360° Feedback is available to all employees on the Lufthansa Group's intranet, allowing them to ask for feedback from managers, colleagues as well as customers and suppliers concerning their own work. Feedback received reflects not only the impression a person makes on others, but also the person's own appraisal in comparison with third parties that helps the employee's personal development. In 2016, about 900 employees used 360° Feedback and received feedback from more than 11,500 managers, colleagues and customers.

## Health management and occupational safety

Comprehensive health protection and occupational safety are an integral part of the Lufthansa Group's sustainable and socially responsible Company policy. In 2016, the Group launched the Company-wide Health Management@LH Group.



### Lufthansa Group Health Management

Health protection and occupational safety have been central action areas at the Lufthansa Group for many years. The Group assessed both aspects as being "very important" in the materiality matrix it developed in 2016 (see page 17 ff., Strategy and management). At the same time, the internal realignment of the Group as a matrix organization is also reflected in health management: To further develop the latter in a Company-wide format, the Group launched the program Health Management@LH Group in 2016. For this purpose, the Lufthansa Group developed a guideline that summarizes the strategic importance, underlying philosophy and goals: Health Management@LH Group aims at supporting the employees' individual responsibility for their health and thus their ability to perform, and at ensuring their physical, intellectual and social well-being. Therefore, the goal is to establish structures and processes that help shape working environments as well as working and cooperating formats in health-promoting ways, thus maintaining and promoting employees' motivation and ability to perform. In turn, this contributes to the Company's economic success.

The program's purpose is to define the Lufthansa Group's health management structures and processes in standard formats, and to combine, interlink and steer health-promoting measures in order to gain efficient synergies.

The structural changes of Health Management@LH Group are oriented by current scientific insights. These are the basis for health promotion aimed at specific target groups. At regular intervals, representatives of the largest Group companies, codetermination committees, occupational safety and disabled employees' groups as well as experts from the medical and psychosocial areas meet under the guidance of Health Management in the central steering committee "Health". In this forum they define standardized procedures in the Lufthansa Group's corporate health management.

#### Outlook 2017

In 2017, Health Management is working on the sustainable evolution of the Company health programs. Among its tasks is to integrate the topic of health into the employee survey "involve me!" planned for 2017 (see page 69) and add health aspects to management and employee qualifications.

### Corporate Medical Services

The Medical Services have a key role in the Lufthansa Group's occupational safety and health protection concept (see page 92, *Balance* 2016). The Corporate Medical Services are addressed to all Group employees and as a comprehensive competency center include not only aviation medicine but also occupational, vaccination and travel medicine, outpatient treatment and comprehensive socio-medical counseling. Beyond these individual treatments, the Medical Services provide comprehensive advice to decision-makers, committees and employee representations concerning all issues of occupational medical protection.

Furthermore, the Lufthansa Group offers its employees and managers access to the services of the Psychosocial Center as a voluntary social benefit (see page 93, *Balance* 2016). Experts counsel and help with problems on the job, during crises and conflict situations, and in the event of private, financial or family-related difficulties. This offer exists at numerous locations in Germany. In 2016, the division organized a total of 184 workshops, training sessions and information events.

Both the Corporate Medical Services and the Psychosocial Center at Deutsche Lufthansa AG are certified in accordance with DIN EN ISO 9001:2008. The medical-professional and service areas are continuously developed further.

Wide range of offers during the Health Days 2017 at the Frankfurt location: sports courses, information booths and interviews, including one with Heike Drechsler (left), a two-time Olympic winner in long jump.



## Occupational safety

An important contribution to employee health also comes from occupational safety. At the Lufthansa Group, preventive measures are consistently implemented to avoid accidents, adverse effects on health and job-related illness. By means of risk assessments and regular safety walkabouts the Group's occupational safety experts check all professional activities in the Group companies. In work areas with particular burdens the aviation company offers its employees programs aimed at promoting health (see page 93, *Balance* 2016).

### Activities in 2016

In 2016, the Group's occupational safety experts focused above all on creating contemporary conditions for effective job protection in a highly interlinked matrix organization. An Occupational Safety Committee (OSC) was established as the central steering body for all issues concerning work-related safety within the Group. Among the committee's members are Lufthansa, SWISS and Austrian Airlines. In addition, the aviation group bundled central topic areas related to occupational safety and transferred responsibility for them to two administrative departments. This allows simpler and faster management of processes across the Group. Clearly as-

signed responsibilities in the organization of occupational safety at the global level ensure that health risks for the Company's own and external employees are avoided in a preventive manner. The job safety processes that are to be newly defined within the Lufthansa Group establish homogenous and binding standards worldwide that offer the same level of protection for all employees and legal certainty for the Company's management.

The OSC is the highest steering body for all subjects concerning job safety at the Lufthansa Group. Among its tasks is to suggest regulations in alignment with local legislation for all business segments and companies, and to ensure the exchange of information concerning relevant topics. The OSC ensures that all interests Group-wide related to occupational safety are taken into consideration, adhered to and standardized.

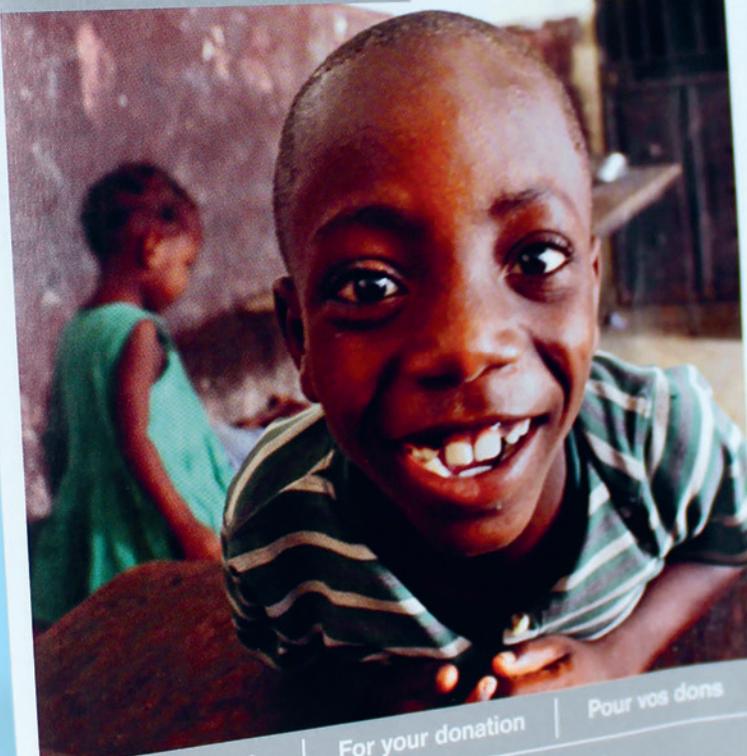
### Number of job-related accidents at very low level

Given the heterogeneous composition of the Lufthansa Group, there are different types of job-related risks. By implementing targeted protective measures, the Group has been able to keep the number of work-related accidents at a very low level. Nevertheless, the Lufthansa Group's goal is to further reduce the number of accidents and to improve occupational protection on a continuous basis.

# CORPORATE CITIZENSHIP

Kleines Geld für große Hilfe  
Small change – it's a big help

*help*alliance  
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## Strategy and management

The Lufthansa Group's stakeholders expect a comprehensive social commitment that reflects the Group's importance and size, and that is transparent, credible and comprehensible at the same time. To meet this expectation, responsible thinking and practice go far beyond the aviation group's operative business activities.

The Lufthansa Group's commitment to social causes has traditionally grown organically and – given the portfolio changes over the past years – is today correspondingly varied as a result. The resources the Group has made available for these activities have on the whole not shown the desired results due to a high degree of division into individual projects. For this reason, since 2015 the Lufthansa Group has concentrated more on its social and humanitarian activities. It was only consistent that the aviation group had its portfolio of commitments evaluated not only internally in 2016, but also by external experts who analyzed and assessed all action fields related to corporate citizenship. The goal was to combine the diverse activities into thematic bundles and thus increase effectiveness to the level desired. The Group airlines were included in this process along with the service companies and marketing function.

### A focused portfolio of commitments

The key result of these analyses is that in future the Lufthansa Group will concentrate entirely on the core areas of education/enabling and life/health. In implementing this approach under the umbrella of the help alliance, which was transformed into a charitable limited liability company (see page 76 ff.), the Group counts on its core competencies: logistics, route network and the diverse know-how of its employees. The Lufthansa Group is convinced that developing a focused portfolio of commitments will benefit society and the Company in equal measure. This also implies that projects with no or a narrow goal or time horizon can be avoided in the future.

### More intensive employee commitment

A goal-oriented social commitment on the part of its employees is an important part of the Lufthansa Group's approach to corporate citizenship and has therefore been part of its HR strategy for many years. To make its employees more aware of sustainability issues and to give them more opportunities for assuming effective social responsibility, the aviation group is working on new concepts for further developing its corporate volunteering offers. These voluntary measures are designed to give employees opportunities to apply their varied individual talents and to use them outside work for solving social problems in a goal-oriented way.

## Social commitment

The Lufthansa Group continually refines the professional structures of its social commitment to make them even more dynamic and sustainable. The focus is on the objective to bundle aid and social integration projects under the aviation company's roof in an economical way and to steer them in a goal-oriented manner.

### help alliance

#### help alliance – New foundations, new perspectives

The central pillar of the Lufthansa Group's social commitment is the help alliance, founded in 1999 by 13 Lufthansa employees as an aid initiative. During the reporting year, the aviation company initiated comprehensive reforms to give the aid organization even more sustainable foundations. The key element of this process was the transformation from charitable association to nonprofit limited liability company on January 1, 2017.

This appropriate change not only creates a base for giving people in need help for self-help in a more effective and measurable way. It also makes a significant contribution to optimizing the Lufthansa Group's social commitment overall, for example by further systematizing fundraising models and thus acquiring donated funds more effectively.

In 2016, the help alliance supported about 40 projects in development cooperation with a total volume of nearly 1.5 million euros. Overall, the Lufthansa employees active as volunteers looked after approximately 140 aid and support projects with a donations volume of more than 10 million euros over the past 17 years. These activities are based on a three-step concept with the central pillars of migration/integration, education and promoting entrepreneurship. Poor, ill and socially disadvantaged children and youths from and

“ Over the past years, it has become increasingly difficult to support the growing volume of our projects with the association's structures. Against this background, the restructuring into a nonprofit limited liability company was both an important and a logical step. ”



Joachim Steinbach  
Managing Director of help alliance gGmbH

Language promotion for refugee children in cooperation with the association "Stern des Südens" is one of the long-term integration projects of the help alliance.



in crisis-affected regions in particular receive an opportunity to lead self-determined lives. All project content is guided by the strict standards of the UN children's rights conventions.

The Lufthansa Group has supported the help alliance's commitments from its inception by providing nonmaterial, communication, logistical and economic support.

## Emphasis of activities in 2016

Education is the key to the successful integration of refugees. Therefore, the help alliance's project portfolio comprises numerous education and integration offers for refugees who have found refuge in Germany. During the reporting year, the help alliance supported several long-term integration projects. The Düsseldorf-based learning-and-coaching project for children and youths with a migration background and from educationally alienated families is exemplary in this area. It was initiated by the association Chancenwerk, which the help alliance has supported since 2015. In the Rhine-Main region, language training for refugee children in cooperation with the association Stern des Südens, a help alliance cooperation partner since 2007, has pivotal importance (see page 100/101, *Balance* 2016).

## Small change – It's a big help

To build bridges leading to a better life for people in need, the help alliance set up the on-board collection program "Small change – It's a big help" in 2001. It gives Lufthansa Group passengers the opportunity to donate coins and bills in any currency that they bring back home on long-haul flights.

### On-board collection program

Development of donation volumes in euros



October 2002:  
September 2011:  
July 2012:

start of Condor's participation  
start of Brussels Airlines' participation  
start of Austrian Airlines' participation

Since early 2016, the Lufthansa Group has participated in the German industry's integration initiative "Wir zusammen" ("We together"), concretely in the mentoring project at the Company's Hamburg location, which has been realized by the help alliance in cooperation with the association basis & woge. Lufthansa Technik employees work as volunteer learning mentors and thus allow young migrants and refugees better opportunities to access the job market. The mentoring program will be continued in 2017.

#### **Berlin: New mentoring program for refugee students**

For many students, fleeing from countries in crisis means the premature end of their academic careers. Missing documents and insufficient language skills are often insurmountable obstacles to continuing their studies in Germany. To help overcome such situations, the help alliance opened the Study Center for refugee students at Berlin's Spreewerkstätten on January 24, 2017, following a preparation phase in 2016 in cooperation with the education platform Kiron Open Higher Education. This meeting and learning place is financed by the help alliance and makes an important contribution to social and cultural integration. About a dozen employees from different Lufthansa Group companies support the future academics on a voluntary basis.

#### **Cologne: Inclusion of refugee children**

The Open School Cologne (OSK) is an officially recognized compensatory school. Not only does it look after local children, but since 2015 also refugee children and youths with special educa-

tional needs. The school finances 13 percent of its budget with its own funds. Another part is provided by the help alliance from donations. Lufthansa Group employees facilitate the inclusion process by giving weekly language lessons to small learning groups of pupils and by acting as contact persons.

Beyond that, the help alliance has initiated education programs in the world's crisis regions to give people perspectives for a better life, either in their home countries or where they found refuge, including a catch-up school for Syrian refugees. More than 100 children attend the school of last resort in Azraq, Jordan. It has been supported by the help alliance since 2016. In climatized school containers that have been provided by the help alliance, children follow classes in accordance with both Jordanian and Syrian curricula. This allows later integration into the regular school system of the country where these refugee children will live permanently. The likelihood of a self-determined life thus increases significantly. In addition, attending school gives them a part of everyday normality back, which has an additional stabilizing effect.

#### **Haiti Entrepreneurship Camp defies hurricane**

The third Haiti Entrepreneurship Camp took place in October 2016 in the capital, Port-au-Prince, despite the devastation from hurricane Matthew in the south of the country. The initiative, which was launched by the help alliance, aims at supporting young people to

“ We would like to link the help alliance's potential even more closely to the Lufthansa Group's strength and network in order to use our core competencies more comprehensively and apply the wide-ranging talents of our employees more effectively. ”



Susanne Kotysch  
Managing Director of help alliance gGmbH  
and Head of Corporate Responsibility &  
Events Management, Lufthansa Group  
Communications

In 2016, Cargo Human Care supported a medical camp in the Massai Mara for the second time.



## Cargo Human Care

Cargo Human Care (CHC) is a humanitarian aid project focused on Kenya. The association, which was founded in 2007 by Lufthansa Cargo employees and German physicians, provides direct medical support for poor, ill and destitute people – free of charge and unbureaucratically. In addition, the charitable organization works for impoverished and ill orphans by giving them a home and opening up educational opportunities.

From CHC's inception, Lufthansa Cargo has supported the charity by providing freight capacities free of charge and air tickets for the physicians who work on a voluntary basis. Lufthansa Cargo employees in Germany also volunteer to coordinate the assignments of medical doctors. Furthermore, CHC covers the costs of the Kenyan personnel at the CHC Medical Center and of treatments and operations required at the local Nazareth Hospital.

Currently, the aid project is able to draw from a pool of 50 German medical doctors with different specializations. All treatments are given at CHC's own medical center in Nairobi. The center also provides free medical care to needy people from the surrounding area and to 120 orphans living at Mothers' Mercy Home in Kianjogu,

start up their own companies. Both the 30 participants and the lecturers, including many Lufthansa Group employees working as volunteers, helped on their days off with emergency aid work in affected areas.

### New fundraising activities

In addition, the help alliance moved forward in 2016 with initiating new fundraising models: Lufthansa Miles & More Credit Card holders have had the option since August 2016 to set an individual amount on the Mastercard donation platform that benefits the help alliance's aid projects with each card transaction. In this way, the social commitment of Lufthansa Group customers is integrated into everyday life and promoted.

[donate.mastercard.com/helpalliance](https://www.mastercard.com/helpalliance)

Another highly successful Miles & More initiative is Miles to Help. It gives participants in Europe's largest frequent flier and premium program the opportunity to donate miles they have earned to help alliance projects. For example, 5,000 donated miles help with financing an additional teaching post in Africa for one month. With 3,000 miles, tuition, teaching materials and uniforms for six children can be provided for one month in India.

[www.helpalliance.org](http://www.helpalliance.org)



## FURTHER SOCIAL PROJECTS SUPPORTED BY GROUP COMPANIES

### Lufthansa Cargo

- Close cooperation for more than 35 years with the registered association “Werkstätten für Behinderte Rhein-Main e. V.” (Workshops for the Disabled) in producing lashing straps used for loading cargo aboard aircraft
- With a current order volume of almost 1.2 million euros Lufthansa Cargo is the largest manufacturing customer at WfB Rhein-Main
- The association was certified in 2016 by the European Aviation Safety Agency (EASA) as development company and by Germany’s Federal Aviation Office (LBA) as manufacturing company
- WfB Rhein-Main is thus one of only six manufacturers worldwide that produce lashing straps certified according to these standards

### SWISS

- The airline has supported SOS Children’s Villages Switzerland since its foundation – among other measures with flight tickets and on-board collections of funds in coins
- Funds donated benefit projects located at SWISS destinations
- Donations collected in 2015 and 2016 were used to renovate 20 family houses at the SOS Children’s Village in Bawana, India, for example

### Austrian Airlines

- Concentration on social projects in central and eastern Europe
- The focus is on renowned organizations such as Global 2000, Help for Children from Belarus, and Alliance for Children

### LSG Sky Chefs

- Its regionally varying commitment includes educational projects, health promotion and sports events, among others

which CHC also supports. During the reporting year, the medical center looked after about 7,000 patients and provided more than 25,000 medical treatments.

The charitable organization is committed to numerous additional areas and projects, and continuously expands the scope of its activities.

### Step by step for a good cause

On August 25, 2016, about 600 runners crossed the starting line under the motto “Step by step. Giving children a future.” in the second Business District Run in Frankfurt’s Niederrad quarter. Total revenues of 16,500 euros benefited the John Kaheni Residence near Nairobi – a residential and training center opened at the end of 2015 that gives a home to youths and young adults between 18 and 24 years of age after they have completed school and while following further education courses. The institution used the funds to buy a battery unit to ensure emergency electricity supply. On August 24, 2017, the third Business District Run will take place. Revenues from this event are to finance the construction of the Happy Child Education Center for preschool children from a slum area in Kawangware on Nairobi’s northern periphery.

[www.cargohumancare.de](http://www.cargohumancare.de)

In 2016, under the motto “Step by step. Giving children a future.” about 600 runners started in the second Business District Run in Frankfurt’s Niederrad quarter.



## Emergency humanitarian aid

Victims of natural disasters or humanitarian crises need effective aid immediately. For this reason, providing transport capacities aboard its freight aircraft in the event of a crisis or catastrophe is an established element of the Lufthansa Group's corporate citizenship concept.

In such cases, Lufthansa Cargo makes freight capacities available either free of charge or at low rates that cover costs. To ensure that initial relief can be launched in an unbureaucratic and swift manner, the Lufthansa Group's logistics specialist closely cooperates with renowned aid organizations.

This includes the long-standing partnership with the emergency aid association "Aktion Deutschland Hilft" and its alliance partner "World Vision Deutschland", among others. This cooperation has guaranteed since the beginning of 2013 that the 23 German aid organizations joined in this alliance have direct access to the logistical infrastructure of Lufthansa Cargo. The goals are to be even better prepared in the event of a catastrophe by bundling re-

sources and know-how, and to be able to set up a functioning logistics chain and set it in motion at short notice (see page 98 f., information illustration, *Balance* 2016).

On December 1, 2016, Lufthansa Cargo signed the same type of cooperation contract with Germany's Red Cross (DRK). The focus of the association between Germany's largest aid organization and the logistics service provider is on the objective of making preparations for aid flights significantly easier and more efficient in the future. This will make the transportation of medications, drinking water treatment equipment and other aid items needed at their destinations at short notice even more flexible and thus faster.

In addition, Lufthansa Cargo has been a member of Airlink since the end of 2016. This noncommercial humanitarian aid organization, which was founded by employees of the International Society of Transport Aircraft Trading Foundation (ISTAT) in 2010, connects airlines and charitable organizations, thus speeding up the delivery of humanitarian aid significantly. Currently, 35 aviation companies and charter airlines as well as 60 charitable organizations around the world participate in Airlink.

Moreover, thanks to the charter services offered under the Network on Demand umbrella, Lufthansa Cargo is also able to transport aid shipments not only within, but also outside of the Lufthansa network to all destinations worldwide – and at any time. For example, in October 2016 Lufthansa Cargo transported more than 70 tonnes of aid supplies aboard an MD-11 freighter to Haiti. It was part of a campaign initiated by "Deutsche Bahn Stiftung" and joined by "Kinderhilfswerk nph" and seven other aid organizations as well as the logistics specialist DB Schenker. The campaign was prompted by the devastating aftermath of hurricane Matthew, which had hit the island nation with wind speeds of up to 230 kilometers per hour; the latest of numerous natural disasters to have occurred there.

Effective December 1, 2016, Lufthansa Cargo signed a cooperation contract with Germany's Red Cross.



## Other commitments

The Lufthansa Group is focusing its corporate citizenship activities more and more on social and humanitarian issues. Nevertheless, the Company has maintained its support in the areas of environment, culture and sports, as in previous years.

### Environmental sponsorship

The long-term protection of the crane and its breeding, resting and gathering areas has a tradition of more than 30 years at the Lufthansa Group. Emphasis is placed on the Crane Protection Germany working group, which the Lufthansa Group founded in 1991 together with Naturschutzbund Deutschland (NABU) and the environmental foundation WWF Deutschland (World Wide Fund For Nature). In particular, the working group supports projects that help ensure the survival of the Eurasian crane, but is also involved in numerous projects in Africa and Asia concerned with research on and protection of crowned, wattled, white-naped and sarus cranes.

#### 25 years of Crane Protection Germany

To visually underline its commitment to these majestic large birds during the anniversary year 2016, the Lufthansa Group featured artwork specifically designed for the occasion on the Airbus A321 “Wismar” for six months: Stylized cranes painted on the fuselage

flew a symbolic appeal for species protection across Europe. In addition, the Lufthansa Group supported the relaunch of the Internet platform [www.kraniche.de](http://www.kraniche.de) during the reporting year.

#### 20-year anniversary of the Crane Information Center

Moreover, the Group supports the Crane Information Center in Groß Mohrdorf operated by the working group. Every year, about 125,000 cranes rest for several weeks in the Darß-Zingst peninsula and the Rügen region of Mecklenburg-Western Pomerania. The center, which attracts more than 15,000 visitors every year, also has an educational mission. Among the rangers who present interesting facts about cranes are Lufthansa Group employees. The observation platform “Cranorama” at Günzer See, which was inaugurated in October 2015, provides visitors with insights into the surrounding nature (see page 104, *Balance* 2016).

Information about species-appropriate animal transport: [www.lufthansa-cargo.com](http://www.lufthansa-cargo.com) also *Balance* 2015, page 101

Anniversary decals: For six months, the Airbus A321 “Wismar” flew with decals on its fuselage depicting stylized cranes on European routes, making a symbolic appeal for species protection.



The Lufthansa Choir celebrated its premiere performance in November 2016 in a concert with the Lufthansa Orchestra.



## Cultural commitment

### Partnership with Gürzenich Orchestra extended

In 2016 the Group prolonged its commitment to the Gürzenich Orchestra in Cologne as First Global Partner. One of the orchestra's highlights during the reporting year was a charity concert at Cologne's Philharmonie. Revenues went to the association "Wir helfen" supported by Cologne-based publishing house DuMont Schauberg, as well as to the help alliance.

### Lufthansa Choir celebrates its premiere

The Lufthansa Choir was founded at the end of 2015 and consists of 50 singers from across the Group. It gave its premiere performance in November 2016 in a concert with the Lufthansa Orchestra. The latter, with more than 65 members and set up in 2011, has made its name above all with the annual spring and fall concerts in Frankfurt. A smaller lineup of the orchestra also performs at occasions such as the memorial event on the first anniversary of the Germanwings accident on March 24, 2016.

## Sports sponsorship

Athletes need experts working in the background in all areas to be able to achieve top performances. The Lufthansa Group sees itself as a part of this "team behind the teams" and has supported associations, institutions and sports clubs for many years. Since 2007, the Lufthansa Group has been a National Sponsor of the German Sports Aid Foundation.

For many years, Lufthansa has been the official airline of the German Olympic teams, copartner of the German Olympic Sports Confederation (DOSB) and cosponsor of the National Paralympic Committee Germany (DBS) (see page 105, *Balance* 2016). In 2016, Lufthansa flew the German Olympic team and the Paralympic team to Rio de Janeiro and back. For the flight home the airline provided a Boeing 747-8 featuring the special design "Olympia Siegerflieger" ("Olympic winner's plane"). In 2016, SWISS also operated flights in its role as official airline and partner of the Swiss Olympic and Swiss Paralympic teams.

How sports sponsorship and social commitment can be connected in meaningful ways was illustrated by the Group during the Olympic year, which also marked the 60th anniversary of the route to Rio de Janeiro. Lufthansa Group employees renovated the charitable professional education institution Centro Comunitário Paulo da Portela (CCCCP) in this Brazilian city. They received hands-on support from Olympic beach volleyball winners Julius Brink and Jonas Reckermann. The CCCC has received support from the help alliance since 2011. Young people receive profession-related instruction and are prepared for university entrance exams, for example.

### Football

Lufthansa has been a partner of the German Soccer Association (DFB) since 2005 and flies the national soccer team to its European championship games. The airline is also active at the football club level as the Official Carrier of FC Bayern München. Furthermore, Eurowings has been Borussia Dortmund's official airline since 2016.

[www.lufthansagroup.com/sports](http://www.lufthansagroup.com/sports)



## SERVICE AND INFORMATION

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## Notes on the scope of consolidation and methodology for calculating absolute and specific consumption and emissions

### Scope of consolidation

Reporting on transport performance, kerosene consumption, and emissions from flight operations in 2016 is – unless noted otherwise – based on the following scope of consolidation:

- Lufthansa (including Lufthansa CityLine and Air Dolomiti), Eurowings (including Germanwings), SWISS (including Edelweiss Air), Austrian Airlines and Lufthansa Cargo. Not included are services performed by third parties, as their performance is beyond our control.
- Types of flight service: all scheduled and charter flights.

### Methodology of calculations

#### Kerosene in absolute terms

Kerosene consumption is calculated on the basis of actual flight operations (i.e. using actual load factors and flight routings) according to the gate-to-gate principle. This covers all phases of a flight, from taxiing on the ground to flying detours and holding patterns in the air.

#### Emissions in absolute terms

The emissions from flight operations are calculated on the basis of actual transport performance and hence on actual load factors and the actual absolute quantity of kerosene consumed in the reporting year. Transport performance is measured in tonne kilometers; i.e., payload transported over a distance. For passengers and their luggage, an average of 100 kilograms is the standard estimate; for freight, it is its scale weight. Each aircraft/engine combination present in the fleet is considered separately, and the associated values are calculated with the aid of computer programs provided by the aircraft and engine manufacturers. The annual average flight profile for each subset of 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 (UHC) in particular. Carbon dioxide (CO<sub>2</sub>) emissions do not require special calculation methods, as they are generated in a fixed ratio to the quantity of kerosene burned. The combustion of 1 tonne of kerosene generates 3.15 tonnes of CO<sub>2</sub>.

#### Specific consumption and emission values

Calculating specific consumption and emissions entails expressing absolute values in relation to transport performance. For example, the ratio liters per 100 passenger kilometers (l/100 pkm) is calculated on the basis of actual load factors along with the quantity of

kerosene actually consumed. The distances used in the calculations are great-circle distances. In combination flights (freight and passenger transport in one aircraft), fuel consumption is attributed on the basis of its share of the total payload to calculate the passenger- and freight-specific figures.

Since 2013, the DIN EN 16258 standard has provided a guide for standardized calculation of greenhouse gas emissions for transport processes. This guide uses the same estimates for calculating payload as the Lufthansa Group. When traveled distances are calculated, 95 kilometers must be added to the great-circle distance according to the guidelines of the EU emission allowance trading scheme. The International Air Transport Association (IATA) has separately developed its own calculation proposals, which deal with the division of fuel consumption between freight and passengers and attribute a larger share of fuel consumption to passengers because of the passenger-specific infrastructure. Although this method has no effect on the overall efficiency of a flight, it changes the apportionment between passengers and freight. There are still divergences between the two methods (including from the method used up to now by Lufthansa). We would welcome a standardized, internationally harmonized and accepted method.

#### Environmental database

The environmental data for this report were compiled by the Lufthansa Group by means of its central environmental database. All Lufthansa Group companies are encouraged to feed their environmentally relevant performance and consumption data (such as fuel consumption) into the Group's environmental database. Data used for the calculation of the Lufthansa Group's carbon footprint (Scope 1 - 3 emissions) were additionally checked by an external auditor for completeness and correctness according to accepted verification standards and verified with High Assurance (Scope 1) and Limited Assurance (Scope 2 and 3) respectively.

#### Accuracy

For presentation purposes the figures in the charts and tables are rounded. Changes from the previous year's figures and share percentages refer in each case to precise figures, however. For this reason it is possible that a reported value may remain the same from one year to the next even though a relative change is reported. Because of the rounding of share percentages, it is also possible that the sum of their addition may differ from the sum of the unrounded percentages. For example, as a result of rounding, share percentages may not add up to 100 percent even though it would be logical to expect them to.

# Environmental data

## Fuel consumption<sup>1</sup>

2016, in tonnes

	Passengers	Freight	Total	Share
<b>Scheduled flights<sup>2,3</sup></b>				
Lufthansa	4,665,045	1,561,742	6,226,787	68.0%
SWISS	1,149,867	419,117	1,568,984	17.1%
Austrian Airlines	607,418	94,772	702,189	7.7%
Eurowings	556,721	868	557,589	6.1%
Third parties <sup>6</sup>	80,219	1,418	81,958	0.9%
<b>Other flights<sup>4</sup></b>			23,884	0.3%
<b>All flights</b>			<b>9,161,392</b>	<b>100.0%</b>

## Share of third parties<sup>6,7</sup>

2016

<b>Flights</b>	3.3%
<b>Passengers</b>	2.8%
<b>Tonne kilometers transported, TKT (tkm)</b>	1.9%
<b>Fuel consumption (tonnes)</b>	0.9%
<b>CO<sub>2</sub> emissions (tonnes)</b>	0.9%

## Specific fuel consumption of passenger transportation compared<sup>3,9</sup>

2016, in liters per 100 passenger kilometers (l / 100 pkm)

	2016	2015	Changes in %
<b>Group fleet</b>	3.85	3.84	+0.2
<b>Lufthansa</b>	3.88	3.86	+0.6
<b>SWISS</b>	3.44	3.53	-2.4
<b>Austrian Airlines</b>	4.04	3.92	+3.0
<b>Eurowings</b>	4.46	4.45	+0.3

## Emissions<sup>3,5</sup>

2016, in tonnes

	Passengers	±2015	Freight	±2015	Total	±2015
<b>CO<sub>2</sub></b>	21,984,012	+1.4%	6,540,969	+0.5%	28,524,981	+1.2%
<b>NO<sub>x</sub></b>	106,453	+2.8%	32,555	+2.1%	139,008	+2.6%
<b>CO</b>	15,974	+1.0%	3,346	+0.5%	19,320	+1.0%
<b>UHC</b>	1,537	+1.9%	343	-1.9%	1,880	+1.2%

## Fuel Dumps<sup>3</sup>

2016

	2016	Changes compared to 2015
<b>Events, total</b>	24	+4
thereof medical reasons	10	-1
technical reasons	13	+4
other reasons	1	+1
<b>Quantity, total<sup>8</sup></b>	1,141 t	+102%

## Specific CO<sub>2</sub> emissions of passenger transportation<sup>3</sup>

2016, in kilograms per 100 passenger kilometers (kg / 100 pkm)

	Long-haul	Medium-haul	Short-haul	Overall average
<b>Group fleet</b>	8.85	10.02	14.77	9.71
<b>Lufthansa</b>	9.22	9.82	15.90	9.78
<b>SWISS</b>	7.86	9.81	20.33	8.67
<b>Austrian Airlines</b>	7.73	11.03	18.51	10.17
<b>Eurowings</b>		10.19	12.00	11.24

Definitions of traffic areas ● Long-haul more than 3,000 km ● Medium-haul 800 to 3,000 km ● Short-haul under 800 km

1 Actual fuel consumption in tonnes from flight operations, based on all flight events under the respective operative flight number. Recorded are consumption values from gate to gate, i.e. including taxiing on the ground, holding patterns and detours in the air.

2 Scheduled flights, charter flights

3 For the reporting year 2016, the following companies have been included in *Balance*: Lufthansa (including Lufthansa CityLine and Air Dolomiti), Lufthansa Cargo, SWISS (including Edelweiss Air), Austrian Airlines and Eurowings (including Germanwings). Excluding the services of third parties as the Company cannot influence their performance (see table Share of third parties).

4 Ferry flights, special flights, training flights, test flights, aborted flights

5 Absolute emissions in tonnes resulting from flight operations (all scheduled and charter

flights). Recorded are consumption values from gate to gate, i.e. including taxiing on the ground, holding patterns and detours in the air (see notes on page 85).

6 Airlines outside the scope of consolidation of *Balance*, but operating services on behalf of Lufthansa, for example in the event of capacity bottlenecks.

7 Excludes road feeder services and partial capacity chartered by Lufthansa Cargo, as no fuel consumption and emissions values are available for this performance.

8 In part projections

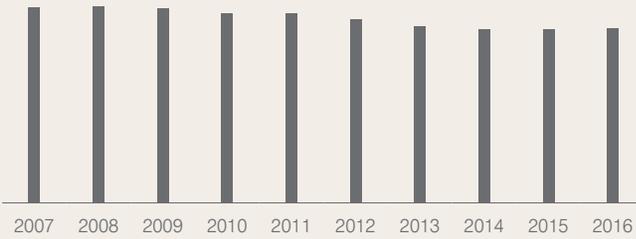
9 From 2016, category Lufthansa excluding Eurowings, category Eurowings including Germanwings. Values for preceding year calculated in comparable manner.

10 On the basis of freight tonne kilometers (FTKT), transported on both cargo and passenger aircraft.

### Specific fuel consumption Passenger transportation<sup>3</sup>

in liters/100 passenger kilometers (l/100 pkm)

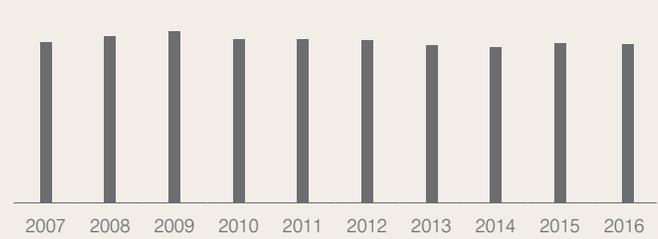
4.32 4.34 4.30 4.20 4.18 4.06 3.91 3.84 3.84 3.85



### Specific fuel consumption Freight transportation<sup>3,10</sup>

in liters /tonne kilometers

0.285 0.295 0.304 0.289 0.289 0.287 0.278 0.276 0.282 0.280



### Passenger transportation<sup>3</sup>

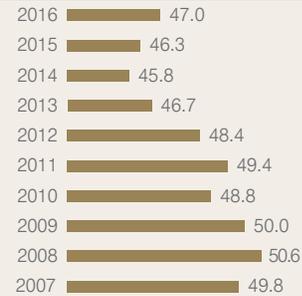
#### CO<sub>2</sub> emissions

in kilograms /100 passenger kilometers



#### NO<sub>x</sub> emissions

in grams /100 passenger kilometers



#### CO emissions

in grams /100 passenger kilometers



#### UHC emissions

in grams /100 passenger kilometers



### Freight transportation<sup>3,10</sup>

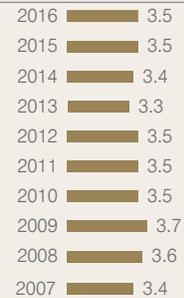
#### CO<sub>2</sub> emissions

in kilograms /tonne kilometers



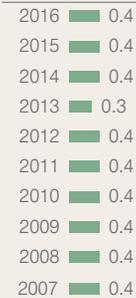
#### NO<sub>x</sub> emissions

in grams /tonne kilometers



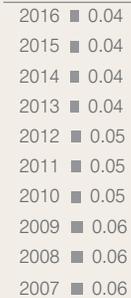
#### CO emissions

in grams /tonne kilometers



#### UHC emissions

in grams /tonne kilometers

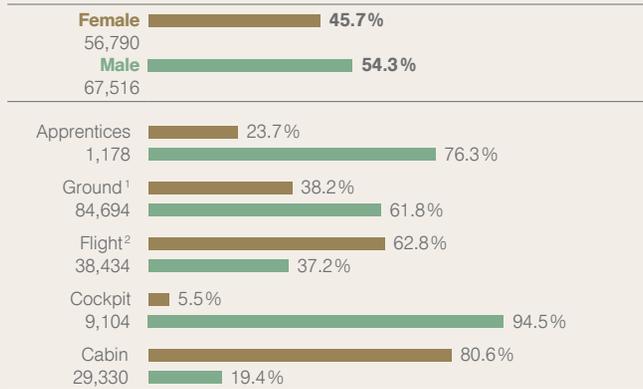


# Personnel data

## Number of employees by professional group and gender

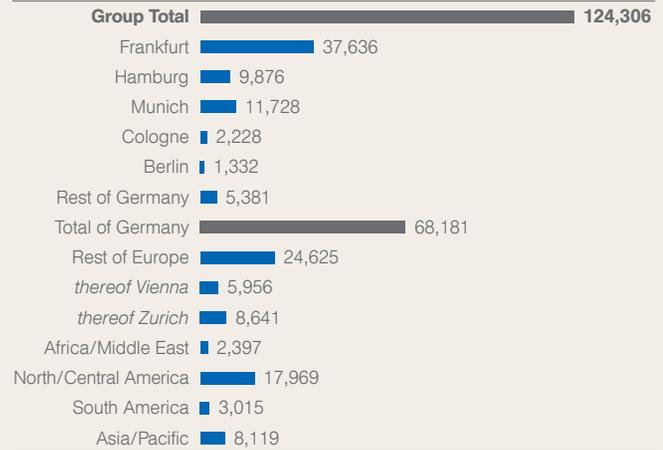
Lufthansa Group, employees as of December 31, 2016

● Female employees ● Male employees



## Job throughout the world

Lufthansa Group, employees as of December 31, 2016



## Share of women in management positions

Lufthansa Group, in percent as of December 31, 2016



## Share of women with staff responsibility

Lufthansa Group, in percent as of December 31, 2016



1 Without apprentices

2 Consists of cockpit and cabin

3 Sphere of application: Group scope of consolidation, without parts of LSG abroad, LH Malta Aircraft-Leasing Ltd., time:matters GmbH, time:matters Spare Parts Logistics GmbH, time:matters Holding GmbH, LH Technik Philippines Inc., LH Technik Puerto Rico LLC, LH Technik Shannon Ltd. Co., LH Technik Malta Ltd., LH Technik Airmotive Ireland Leasing Ltd.

Co., LH Technik Budapest Repülöge, Hawker Pacific Aerospace (US), Aerologic GmbH (25 percent partially consolidated), LH Technik Landing Gear Services UK Ltd., BizJet International Sales & Support Inc., LH Technik North America Holding Corp., LH Technik Sofia OOD, LH Technik Component Services LLC, LH Malta Holding Ltd., LH Malta Corporate Finance Ltd., LHAMIH LIMITED, LH Malta Finance Holding Ltd.

## Average age

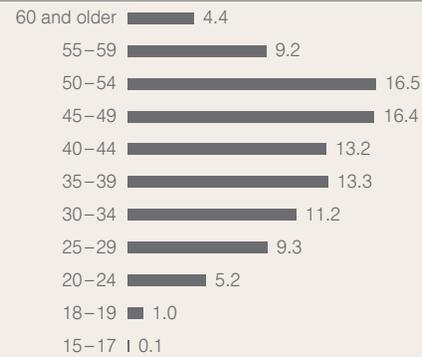
Lufthansa Group, in years as of December 31, 2016

● Female employees ● Male employees ● Total



## Age structure<sup>3</sup>

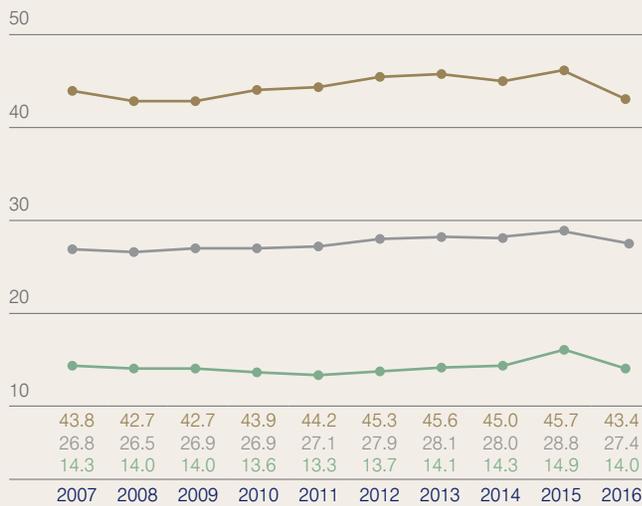
Lufthansa Group, in percent as of December 31, 2016



## Part-time employment

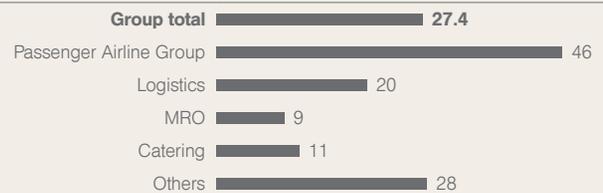
Lufthansa Group, in percent as of December 31, 2016

● Female employees ● Male employees ● Total



## Part-time work by Group companies

Lufthansa Group, in percent as of December 31, 2016



## Distribution of employees

Lufthansa Group, employees as of December 31, 2016

	2016	2015	Change
<b>Group total</b>	<b>124,306</b>	<b>120,652</b>	<b>+3.0%</b>
of which Passenger Airline Group	54,308	55,255	-1.7%
of which Logistics	4,568	4,607	-0.8%
of which MRO	20,839	20,661	+0.9%
of which Catering	35,530	34,310	+3.6%
of which others	9,061	5,819	+55.7%

## Verification statement Scope 1-3

verification statement

# MÜLLER-BBM CERT GMBH

Müller-BBM Cert GmbH, accredited verifier DAKKS D-VS-18709-01-01, accredited and approved for air transportation confirms, that CO<sub>2</sub> emissions data in the submitted Climate Change 2017 CDP final report, dated 2017/05/30 and those in figure "Direct and indirect CO<sub>2</sub> emissions of the Lufthansa Group" on page 37 of the sustainability report *Balance*, issue 2017, of

## Lufthansa Group Deutsche Lufthansa AG and affiliates\*

are verified under the verification standards

- EU Emissions Trading Scheme (EU ETS) Directive and EU ETS related national implementation laws
- Airport Carbon Accreditation (ACA) of Airports Council International Europe

with following uncertainties:

Scope 1	29,250,821 t CO <sub>2eq</sub> (high assurance)
Scope 2	275,161 t CO <sub>2eq</sub> (limited assurance)
Scope 3	8,774,231 t CO <sub>2eq</sub> (limited assurance)

Kerpen, May 30, 2017



Müller-BBM Cert GmbH

\* Scope of application from organizations at CDP report 2017: Deutsche Lufthansa AG, Lufthansa Cargo AG, Lufthansa Technik AG, Lufthansa CityLine GmbH, Swiss International Air Lines AG, Edelweiss Air AG, Austrian Airlines AG, Air Dolomiti S.p.A Linee Aeree Regionali Europee, Germanwings GmbH, Eurowings Aviation GmbH, LSG Lufthansa Service Holding AG, Lufthansa AirPlus Servicekarten GmbH, Lufthansa Global Business Services GmbH, Lufthansa Seeheim GmbH, Miles & More GmbH, Lufthansa Process Management GmbH, Lufthansa Systems GmbH & Co.KG, Lufthansa Industry Solutions GmbH & Co.KG, Lufthansa Flight Training GmbH, LZ-Catering GmbH.

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info@MuellerBBM-Cert.de | www.MuellerBBM-Cert.de

**MBBM**  
MÜLLER-BBM GRUPPE

## Glossary

### A

#### Aerosols

Aerosols are solid and/or liquid particles that are suspended in the air. They reach the atmosphere by means of natural processes (wind, desert storms, volcanic eruptions) or human activities (combustion of biomass and fossil fuels). The most important aerosols are mineral dust, sea salt, cellular (biological) particles, soot, organic compounds, and sulfates. From a climatic perspective, aerosols are the opponents of greenhouse gases, as they can reflect incident light and thus have a cooling effect.

#### aireg e. V. – Aviation Initiative for Renewable Energy in Germany

aireg is a registered association of leading German research institutions, Lufthansa and other companies in the aviation industry, and bioenergy producers. The goal of this initiative, which was founded in 2011, is to advance the development and introduction of regenerative aviation fuels in Germany and to inform the public at large about this topic. [www.aireg.de](http://www.aireg.de)

#### ATM – Air Traffic Management

Air traffic management ensures both the safe and the efficient movement of aircraft in all phases of operations.

#### Atmosphere

Mass of air surrounding the Earth. It is divided into various layers, which are separated from one another by significantly different vertical temperature distributions. Important for air traffic are the two lower layers: the troposphere and, above it, the stratosphere. 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 eight to 12 kilometers above sea level at the poles. The temperature in the tropopause, the transition layer between troposphere and stratosphere, drops to about minus 60 degrees Celsius. It rises again in the stratosphere.

### C

#### Carbon dioxide (CO<sub>2</sub>)

Gas resulting in nature from the burning or decomposition of organic substances (e.g. plant material). The greenhouse gas CO<sub>2</sub> remains in the atmosphere for about 100 years. Scientists attribute the increase in 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 tonne of fuel, 3.15 tonnes of CO<sub>2</sub> result from the combustion process. Currently, about 2.55 percent of the CO<sub>2</sub> emissions due to human activities are caused by global air traffic. (Source: International Energy Agency (IEA) 2016, 2014 values)

#### 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.

#### CDP (previously Carbon Disclosure Project)

The CDP is an independent nongovernmental organization with a current membership of more than 820 institutional investors worldwide. Every year this initiative, which was founded in 2000, gathers data and information on CO<sub>2</sub> emissions, climate risks as well as reduction goals and strategies on a voluntary basis from corporations and organizations on behalf of investors by means of standardized questionnaires. In 2016, 6,000 companies and organizations published their greenhouse gas emissions and other environmentally relevant performance ratios in this way. Today, CDP administers the world's largest database of its kind. Investors use this data to assess long-term opportunities and risks for the companies in their portfolios, to determine their investment strategy and to develop investment products and indices. [www.cdp.net](http://www.cdp.net)

#### Chapter 4 aircraft

Aircraft that comply with 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 since 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 depend on the aircraft's maximum takeoff weight and number of engines. From December 31, 2017, the new Chapter 14 standard will apply for newly-certified regional aircraft; for all other aircraft from December 31, 2020.

CO – see “Carbon monoxide”

CO<sub>2</sub> – see “Carbon dioxide”

#### Compliance

Compliance describes in their entirety all measures that ensure the lawful conduct of companies, their management bodies, and their employees with regard to legal directives and interdictions.

#### Corporate Responsibility (CR)

Corporate responsibility expresses the degree to which a company assumes accountability for the effects its business activities have on employees, customers, society, and the environment.

## D

### Decibel

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 sound 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.

### 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 – Deutsches Zentrum für Luft- und Raumfahrt (German Aerospace Center)

The DLR serves scientific, economic and social purposes. It maintains numerous institutes, testing facilities and operational centers. Its declared 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 tasks among European partners.

📄 [www.dlr.de](http://www.dlr.de)

### DNWE – Deutsches Netzwerk Wirtschaftsethik (German Network for Business Ethics)

DNWE is a nonprofit organization of which Lufthansa has been a member since January 1998. DNWE has more than 600 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)

## E

### EBIT

Financial indicator; it denotes earnings before interest and taxes. From financial year 2015 used as the central earnings indicator. It is calculated from total operating income minus operating expenses plus the result from equity investments.

### ECPI

The Lufthansa Group's place in the ECPI® Index family was confirmed in 2016. This index comprises the 150 highest-capitalized companies within the European economic and monetary union, which represent suitable and sustainable investments according to the ECPI's screening method. The ECPI analyzes data in the envi-

ronmental, social and governance (ESG) areas of companies as well as the development, calculation and publication of ECPI indices. It monitors 4,000 issuers by means of a disciplined and certified method that covers a range of ESG criteria.

### EMAS – Environmental Management and Audit Scheme

European regulations concerning environmental management and certification; colloquially referred to as EU eco-audit regulations.

### 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.

## F

### Freight performance (FTKO/FTKT)

Airlines distinguish between freight performance offered (FTKO, freight tonne kilometers offered) and its sold freight performance (FTKT, freight tonne kilometers transported). See also "Tonne kilometers".

### FTSE4Good

The index was introduced in 2001 by FTSE, a wholly owned subsidiary of the London Stock Exchange. It lists only those companies that meet the internationally accepted standards for corporate responsibility in the following dimensions: environmental management, climate change, human and labor rights along the supply chain, corporate governance, and anti-corruption efforts. Lufthansa has been listed since 2001. 📄 [www.ftse.com](http://www.ftse.com)

### Fuel dump

Dumping of fuel in flight due to emergency situations to reduce a long-haul aircraft's weight to the maximum permissible landing weight before unscheduled landings (e.g. in the event of technical problems or serious passenger illness). Special air space is assigned to the aircraft, if possible above uninhabited or thinly populated areas. Fuel is usually dumped at altitudes of 4 to 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 detected so far in plant or soil samples after fuel dumps.

## G

### Great-circle distance

The shortest distance between two points on the Earth's surface, measured in kilometers (great circle kilometers) or nautical miles. The center of a great circle is the center of the Earth.

**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 gases are carbon dioxide from the combustion of fossil fuels and methane, primarily from agriculture and industrial livestock farming. 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).

**H****Hub**

In air transport, a hub is a central traffic point or an airline's transfer airport. Passengers and freight are transported from their point of departure to one of the airline's "home airports" (hub). From there, they are carried to their destination by a second flight alongside passengers and freight from other departure points, but with the same destination.

**I****IATA – International Air Transport Association**

The umbrella organization of international commercial aviation.

[www.iata.org](http://www.iata.org)

**ICAO – International Civil Aviation Organization**

A United Nations agency that develops internationally binding norms for civil aviation. [www.icao.int](http://www.icao.int)

**ILO standards**

Work standards of the International Labor Organization, which include, among others, the bans on child labor, forced labor, and discrimination as well as the fundamental right of freedom of association for employees.

**ISO 9001:2008**

The international standard DIN EN ISO 9001:2008 defines the requirements a quality management system must fulfill. Proof that the standard is adhered to is given by independent certifiers, who issue a certificate with fixed validity after a validation.

[www.iso.org](http://www.iso.org)

**ISO 14001 – International environmental management system**

Companies thereby receive an effective instrument that allows them to take environmental aspects into consideration in decisions relating to corporate policies and to continuously improve the situation of environmental care in relation to all daily tasks.

[www.iso.org](http://www.iso.org)

**K****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.

**L**

**Load factor** – see explanation under "seat load factor"

**M****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.

**MSCI Global Sustainability Index Series**

The US index provider MSCI launched a series of sustainability indices in September 2010. The MCSI index family comprises seven environmental, two value-based and 15 best-of-class indices. These include shares of companies with high and medium market capitalization and are based on the MSCI World Index. They depict companies that are particularly committed to environmental, social and governance (ESG) issues. Lufthansa has been included in this index series since June 2015. [www.msci.com/esg-indexes](http://www.msci.com/esg-indexes)

**MTOW**

Acronym standing for maximum takeoff weight of an aircraft.

**N****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. Air traffic contributes 2 to 3 percent of man-made 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.

**NO<sub>x</sub>** – see "Nitrogen oxides"

## O

### oekom

The oekom Corporate Rating evaluates the social and environmental compatibility of companies according to a selection of 100 industry-specific indicators on average. Companies that rank in the top of their respective industries in the context of an oekom Corporate Rating and fulfill the industry-specific minimum criteria are awarded the oekom Prime Status by oekom research.

🌐 [www.oekom-research.com](http://www.oekom-research.com)

### 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

Molecule formed in the stratosphere and consisting of three oxygen atoms. 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 to 4 percent on the heavily-flown North Atlantic routes.

## P

### Passenger kilometer (PKO/PKT)

Measure for transport performance in passenger carriage (number of passengers multiplied by distance flown). A distinction is made between available transport performance (PKO, passenger kilometers offered, or, synonymously, SKO, seat kilometers offered) and actual transport performance (PKT, passenger kilometers transported).

## S

### SAFUG – Sustainable Aviation Fuel Users Group

Initiative of airlines, aircraft manufacturers, and providers of refinery technology whose goal is to accelerate the development and commercialization of sustainable fuels for the air transport industry.

🌐 [www.safug.org](http://www.safug.org)

### Seat kilometer

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

### Seat load factor / overall load factor

Utilization of capacities expressed in percent. The load factor describes the ratio of performance sold to performance offered. The seat load factor (SLF) is applied to passenger transport; the overall load factor (OLF) to freight transport or total transport performance.

### 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.

## T

### Tonne kilometer (TKT/TKO)

Measure of transport performance (payload multiplied by distance). A distinction is made between available transport performance (TKO, tonne kilometers offered) and the actual transport performance (TKT, tonne kilometers transported). In calculating payloads, passengers are taken into account by means of a statistical average weight.

### Transparency International

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

## U

### UHC – Unburned hydrocarbons

Organic mixture of carbon and hydrogen that results from the incomplete combustion of fuels containing hydrocarbons or from the evaporation of fuel.

## W

### Water vapor

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 kilogram of kerosene burned, 1.24 kilograms 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.

### Wet-lease

Leasing of an aircraft from another airline, including its cockpit and cabin crews as well as maintenance and insurance.

## GRI index

### GENERAL STANDARD DISCLOSURE

STRATEGY & ANALYSIS		
G4-1	Statement by the Executive Board on the organization's sustainability	page 3
G4-2	Description of key impacts, risks and opportunities	page 16 ff., page 33 Annual Report 2016, page 57 ff.
ORGANIZATIONAL PROFILE		
G4-3	Name of the organization	page 4 f.
G4-4	Primary brands, products and services	page 4 f.
G4-5	Location of the organization's headquarters	page 4 f.
G4-6	Countries where the organization operates	page 4 f. For further important locations of service companies see Annual Report 2016, pages 52 and 55
G4-7	Nature of ownership and legal form	page 4 f. Annual Report 2016, page 8 The shareholder structure, updated quarterly, can be accessed at: <a href="http://www.lufthansagroup.com/investor-relations">www.lufthansagroup.com/investor-relations</a>
G4-8	Markets served	page 4 f. Annual Report 2016, page 15 f. Given their materiality, the information presented in the sustainability report refer to the worldwide route network of the Lufthansa Group airlines.
G4-9	Scale of the organization	page 2, page 4 f. Annual Report 2016
G4-10 UNGC	Employee figures	page 88 f. No separation by gender and by region, as this data is not control relevant. No description of staff by employees and staff subject to directives, and no indication of the share recognized as permanent freelance employees, and employees and staff subject to directives of contractual partners.
G4-11 UNGC OECD	Employees covered by collective bargaining agreements	In Germany, almost all companies are subject to collective agreements (close to 100 percent). For the entire Lufthansa Group this statement is not possible at the moment.
G4-12	Description of the organization's supply chain	page 4 f., page 85 In this report, the primary focus is on the product "flying" without upstream and downstream processes.
G4-13	Significant changes during the reporting period regarding the organization's size, structure or ownership	No significant changes during the reporting year
G4-14 UNGC	Explanation of how the precautionary principle is addressed	The management of opportunities and risks is integrated in all business processes, see Annual Report 2016, page 57 ff. To manage environmentally relevant opportunities and risks, the Group has developed numerous mechanisms. These range from the Environmental Strategy 2020 to environmental programs and environmental management systems, see page 33 ff.
G4-15	Externally developed sustainability agreements/principles/initiatives to which the organization subscribes or which it endorses	page 22, page 26 An overview of the most important, voluntarily supported initiatives can be accessed at: <a href="http://www.lufthansagroup.com/responsibility">www.lufthansagroup.com/responsibility</a>
G4-16	Active memberships of associations and organizations	page 22 An overview of the most important memberships can be accessed at: <a href="http://www.lufthansagroup.com/responsibility">www.lufthansagroup.com/responsibility</a>
IDENTIFIED MATERIAL ASPECTS AND BOUNDARIES		
G4-17	Companies included in the consolidated financial statement	page 1, page 85
G4-18	Process for defining the report content	page 19
G4-19	Identified material aspects	page 20 f.
G4-20	Report the Aspect Boundary within the organization	page 20 f.
G4-21	Report the Aspect Boundary outside the organization	page 20 f.
G4-22	Effects and reasons of any restatements of information	No significant changes during the reporting year
G4-23	Changes in the scope, aspect boundaries or measuring methods applied	page 20 f.

STAKEHOLDER ENGAGEMENT		
G4-24	List of stakeholder groups engaged by the organization	page 19
G4-25	Identification and selection of stakeholders with whom to engage	page 19
G4-26	Approaches to stakeholder engagement	page 23
G4-27	Results of the engagement	page 20 f.
REPORT PROFILE		
G4-28	Reporting period	page 1
G4-29	Previous report	page 1
G4-30	Reporting cycle	page 1
G4-31	Contact point for questions regarding the report	page 99
G4-32	GRI Index	page 1, page 95 ff.
G4-33	External assurance	The current report was not audited externally, except the Scope1-3 emissions data (see page 90, Verification statement).
GOVERNANCE		
G4-34	Governance structure of the organization	page 16 Annual Report 2016, page 11, page 75
ETHICS AND INTEGRITY		
G4-56	Organization's values, principles, standards and norms of behavior	page 24 ff. A Code of Conduct was adopted in 2017. Internal and external communication will follow in the course of 2017.
G4-57	Internal and external mechanisms for seeking advice on ethical and lawful behavior	page 24 ff.
G4-58	Mechanisms for reporting concerns about unethical or unlawful behavior	page 26

## SPECIFIC STANDARD DISCLOSURES

CATEGORY: ECONOMIC ECONOMIC PERFORMANCE		
G4-DMA	Disclosure on management approach	page 17 f.
G4-EC1	Direct economic value generated and distributed	page 2 For additional data see Annual Report 2016
G4-EC2	Implications, risks and opportunities related to the organization's action due to climate change	page 33 In addition, there is comprehensive reporting on the participation in the CDP climate change report, see: <a href="http://www.cdp.net">www.cdp.net</a>
G4-EC3	Coverage of the organization's defined benefit plan obligations	page 68 f. Annual Report 2016, page 129 f.
MARKET PRESENCE		
G4-EC5	Ratios of standard entry level wage by gender compared to local minimum wage at significant locations of operation	The Lufthansa Group has its main business location in Germany. As almost all Group companies are subject to collective agreements, and thus also to legal minimum wage standards, further data is not control relevant.
CATEGORY: ENVIRONMENTAL ENERGY		
G4-DMA	Disclosure on management approach	page 33 ff., page 36 ff.
G4-EN3	Energy consumption within the organization	page 86
G4-EN4	Energy consumption outside the organization	page 37
G4-EN5	Energy intensity	page 38 f., page 86 f.
G4-EN6	Reduction of energy consumption	pages 40-44
WATER		
G4-DMA	Disclosure on management approach	The current report concentrates primarily on describing the product "flying" without upstream and downstream processes. Therefore, the focus of reporting is on fuel consumption and emissions produced by the Lufthansa Group airlines.
EMISSIONS		
G4-DMA	Disclosure on management approach	page 36 ff.
G4-EN15	Direct greenhouse gas (GHG) emissions	page 37
G4-EN16	Energy indirect greenhouse gas (GHG) emissions	page 37
G4-EN17	Other indirect greenhouse gas (GHG) emissions	page 37
G4-EN18	Intensity of greenhouse gas (GHG) emissions	page 38 f., page 86 f.
G4-EN19	Reduction of greenhouse gas (GHG) emissions	page 43
G4-EN21	NOx, SOx, and other significant air emissions	page 87

EFFLUENTS & WASTE		
G4-DMA	Disclosure on management approach	page 45 f. The current report concentrates primarily on describing the product "flying" without upstream and downstream processes. Therefore, the focus of reporting is on fuel consumption and emissions produced by the Lufthansa Group airlines.
PRODUCTS AND SERVICES		
G4-DMA	Disclosure on management approach	page 33 ff., page 36 ff.
G4-EN27	Extent of impact mitigation of environmental impacts of products and services	page 36 ff.
SUPPLIER ENVIRONMENTAL ASSESSMENT		
G4-EN32	Percentage of new suppliers that were screened using environmental criteria	page 27 There are plans to anchor the subject of sustainability even more profoundly in the supply chain in the future. For this purpose, non-financial ratios are to be developed to be better able to measure sustainability-relevant aspects in the procurement process.
CATEGORY: SOCIAL LABOR PRACTICES AND DECENT WORK EMPLOYMENT		
G4-DMA	Disclosure on management approach	page 61 ff.
G4-LA3	Return to work and retention rates after parental leave	page 66 The compatibility of work and private life is an important element for the Lufthansa Group to provide long-term support to employees to maintain their ability to work and perform. During the reporting year, 27.4 percent of the Lufthansa Group's employees worked part-time, 72.3 percent of whom were women. Furthermore, numerous employees took family leave. A nuanced analysis of return rates is currently not yet possible, but is targeted for the future.
LABOR/MANAGEMENT RELATIONS		
G4-DMA	Disclosure on management approach	page 68 ff.
G4-LA4 UNGC	Minimum notice periods regarding operational changes	In accordance with the stipulations of Industrial Relations Law and in the sense of an active social partnership, the responsible bodies of codetermination and the Company's publics are informed at an early stage.
OCCUPATIONAL HEALTH AND SAFETY		
G4-DMA	Disclosure on management approach	page 72 f.
G4-LA5 OECD	Percentage of total workforce represented in formal management-worker health and safety committees	In Germany, work protection committees that include representatives of employees and employer are active at all locations of the Lufthansa Group. They jointly optimize processes and agree on measures to improve work protection. All employees in Germany are represented in work protection committees.
G4-LA8 OECD	Health and safety topics covered in formal agreements with trade unions	Occupational safety is regulated in Germany by the Occupational Health and Safety Act and other legal stipulations. Within the Lufthansa Group, occupational safety is regulated within the Company's own responsibility and in cooperation between the divisions Occupational Safety and Corporate Medical Services, and the employees' representations. Employment agreements were concluded concerning a number of subjects. The continued evolution in this area is ensured.
TRAINING AND EDUCATION		
G4-DMA	Disclosure on management approach	page 70 f.
G4-LA10 OECD	Programs for skills management and lifelong learning	page 62, page 69
DIVERSITY AND EQUAL OPPORTUNITY		
G4-DMA	Disclosure on management approach	page 63 ff.
G4-LA12	Composition of governance bodies and employee breakdown	The composition of the supervisory bodies is monitored with regard to the share of women and used for targeted control. An extension of this view to further diversity criteria, such as age and internationality, is planned as a perspective for management positions and the Executive Board/top management. Further differentiation is currently not control relevant for the Lufthansa Group.
EQUAL REMUNERATION FOR MEN AND WOMEN		
G4-LA13	Ratio of basic salary and remuneration of women to men	page 66
SUPPLIER LABOR PRACTICE ASSESSMENT		
G4-LA14	Percentage of new suppliers that were screened using labor practices criteria	page 27 There are plans to anchor the subject of sustainability even more profoundly in the supply chain in the future. For this purpose, non-financial ratios are to be developed to be better able to measure sustainability-relevant aspects in the procurement process.

HUMAN RIGHTS INVESTMENTS		
G4-DMA	Disclosure on management approach	page 24 ff.
G4-HR2	Employee training on human rights	Concerning the topic of human rights, a due diligence process is currently being developed that is also to include a training tool. In the past, a voluntary learning tool was available on the Group intranet. Indications concerning the number of training hours are not possible.
EQUAL OPPORTUNITIES		
G4-DMA	Disclosure on management approach	page 63 ff.
G4-HR3 UNGC OECD	Total number of incidents of discrimination and corrective actions taken	A tried-and-tested complaints management exists at the Lufthansa Group, which is also used for complaints concerning human rights. It provides that employees contact their direct supervisor, HR or their internal employee representations, or the external ombudsman. In the event of justified complaints, appropriate countermeasures are taken.
FREEDOM OF ASSOCIATION AND COLLECTIVE BARGAINING		
G4-DMA	Disclosure on management approach	page 68 f.
G4-HR4 UNGC OECD	Right to exercise freedom of association and collective bargaining	For the reporting year it is assumed that no business activity of the Lufthansa Group posed a risk for the employees' free exercise of their rights concerning the freedom of association and collective bargaining.
ASSESSMENT		
G4-HR9	Business locations that were screened using human rights criteria	page 26 f. In the process of human-rights related due diligence, risk countries and Group companies in Extreme Risk and High Risk countries were identified. In the subsequent process, the individual companies will identify their specific risks. Individual locations have not yet been assessed. The principles of the UN Global Compact have been in effect since 2002 on a global scale.
SUPPLIER HUMAN RIGHTS ASSESSMENT		
G4-HR10	Percentage of new suppliers that were screened using human rights criteria	page 27 There are plans to anchor the subject of sustainability even more profoundly in the supply chain in the future. For this purpose, non-financial ratios are to be developed to be better able to measure sustainability-relevant aspects in the procurement process.
HUMAN RIGHTS GRIEVANCE MECHANISMS		
G4-HR12	Number of grievances about human rights impacts filed, addressed and resolved through formal grievance mechanisms	see G4-HR3
ANTI-CORRUPTION		
G4-DMA	Disclosure on management approach	page 24
G4-SO3 UNGC OECD	Operations assessed for risks related to corruption	page 26
G4-SO4 UNGC OECD	Communication and training on anti-corruption policies and procedures	page 25
SUPPLIER SOCIETY IMPACT ASSESSMENT		
G4-SO9 OECD	Percentage of new suppliers that were screened using criteria for impacts on society	page 27 There are plans to anchor the subject of sustainability even more profoundly in the supply chain in the future. For this purpose, non-financial ratios are to be developed to be better able to measure sustainability-relevant aspects in the procurement process.
PRODUCT RESPONSIBILITY		
CUSTOMER HEALTH AND SAFETY		
G4-DMA	Disclosure on management approach	page 56 ff.
G4-PR1 OECD	Percentage of significant product and service categories for which health and safety impacts are assessed	page 56 ff.
PRODUCT AND SERVICE LABELING		
G4-DMA	Disclosure on management approach	page 53 ff.
G4-PR5	Results of surveys measuring customer satisfaction	page 53 f.
CUSTOMER PRIVACY		
G4-DMA	Disclosure on management approach	page 58 f.
G4-PR8	Substantiated complaints regarding data protection	page 58 In 2016, as in 2015, the Lufthansa Group did not record a reportable violation of data protection as defined by Germany's Federal Data Protection Act.

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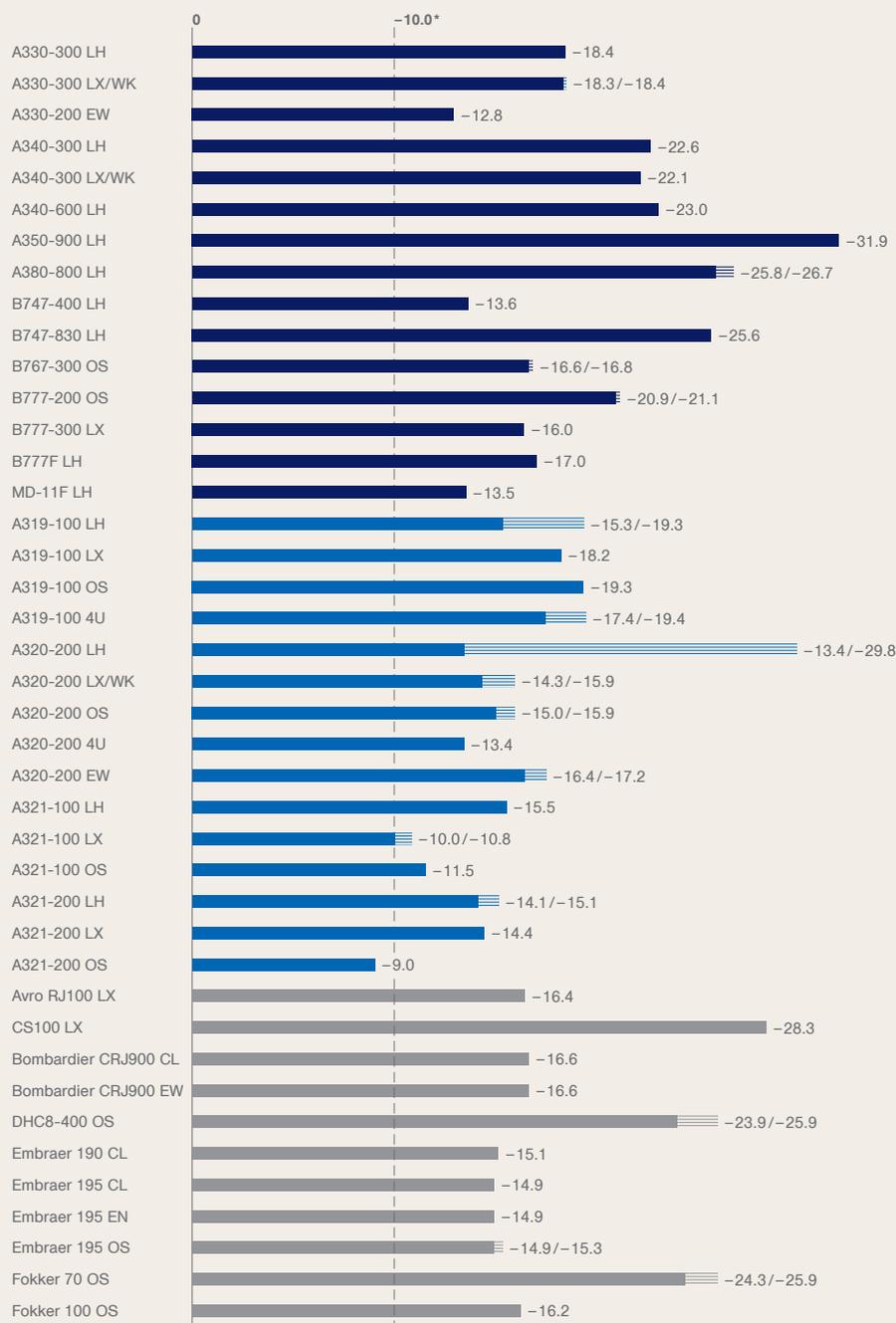
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# Most stringent noise standards for the Lufthansa Group's fleet

## Margins below the noise limit of ICAO Chapter 3 and Chapter 4

Active fleet of the Lufthansa Group on December 31, 2016  
in EPNdB



Of the 613 aircraft in the Lufthansa Group's active fleet, 610 fulfill the stringent Chapter 4 noise standard of the International Civil Aviation Organization (ICAO). The most important element of Chapter 4 is the minus 10 EPNdB criterion (Effective Perceived Noise dB); see the vertical broken line in the overview on the left. The limits depend on the aircraft's maximum takeoff weight and number of engines.

The bar chart indicates the sum of the differences between the measured value and the threshold value at the three measuring points by type of aircraft (cumulated margin). Where necessary, the values based on the reduced maximum takeoff weight prevailing in flight operations are indicated. To allow a more transparent depiction, an improved method of analysis was developed for the previous issues of *Balance*, which include the individual noise certificate data of all Group aircraft. Different versions of an aircraft and its engines by year of construction are thus better taken into account. Accordingly, the value ranges from the lowest to the highest cumulated margin are indicated for many fleets. The analysis also takes into account any modifications to aircraft or engines that have been made in the meantime, thereby leading to modified noise data and cumulated margins in certain cases. In addition, numerous additions and withdrawals in individual fleets lead to changes in the value ranges reported.

Grouping of aircraft types according to MTOW (maximum takeoff weight):  
 ● under 50t ● 50 to 150t ● more than 150t  
 This division generally corresponds to a grouping of regional, continental, and intercontinental aircraft.

4U = Germanwings  
 CL = Lufthansa CityLine  
 EN = Air Dolomiti  
 EW = Eurowings  
 LH = Lufthansa, Lufthansa Cargo  
 LX = SWISS  
 OS = Austrian Airlines  
 WK = Edelweiss Air

\* New ICAO Chapter 4 limit, which has been effective for new aircraft since 2006:  
 -10 EPNdB when compared to Chapter 3.

# The operating fleet of the Lufthansa Group

(as of December 31, 2016)

## Lufthansa and regional partners



Airbus A380-800 LH: 14 aircraft, 509 seats, 12,400 km range



Boeing 747-8 LH: 19 aircraft, 364 seats, 13,000 km range



Boeing 747-400 LH: 13 aircraft, 371 seats, 11,850 km range



Airbus A340-600 LH: 24 aircraft, 297 seats, 12,900 km range



Airbus A350-900 LH: 1 aircraft, 293 seats, 12,650 km range



Airbus A340-300 LH: 12 aircraft, 283 seats, 11,800 km range  
CL: 6 aircraft, 300 seats, 11,500 km range



Airbus A330-300 LH: 19 aircraft, 236 seats, 9,850 km range



Airbus A321-100/200 LH: 63 aircraft, 200 seats, 2,600 km/4,150 km range



Airbus A320neo LH: 5 aircraft, 180 seats, 3,000 km range



Airbus A320-200 LH: 62 aircraft, 168 seats, 3,200 km range



Airbus A319-100 LH: 30 aircraft, 138 seats, 3,350 km range



Embraer 195 CL: 14 aircraft, 120 seats, 2,300 km range  
EN: 10 aircraft, 120 seats, 2,300 km range



Embraer 190 CL: 9 aircraft, 100 seats, 3,500 km range



Bombardier CRJ900 CL: 29 aircraft, 90 seats, 2,100 km range

## Eurowings and Germanwings



Airbus A330-200 EW: 6 aircraft, 310 seats, 10,100 km range



Airbus A320-200 EW: 25 aircraft, 180 seats, 4,000 km range  
4U: 16 aircraft, 168 seats, 3,100 km range



Airbus A319-100 4U: 43 aircraft, 150 seats, 2,900 km range



Bombardier CRJ900 EW: 6 aircraft, 90 seats, 2,100 km range

## Lufthansa Cargo



Boeing MD-11F LH: 12 aircraft, 579 m<sup>3</sup>/89.4t, 6,700 km range



Boeing 777F LH: 5 aircraft, 657 m<sup>3</sup>/103t, 8,900 km range

## SWISS and Edelweiss Air



Boeing 777-300ER LX: 6 aircraft, 340 seats, 13,650 km range



Airbus A340-300 LX: 10 aircraft, 219 seats, 13,000 km range



Airbus A330-300 LX: 14 aircraft, 236 seats, 9,850 km range



Airbus A321-100/200 LX: 9 aircraft, 219 seats, 2,100 km range



Airbus A320-200 LX: 22 aircraft, 180 seats, 2,700 km range



Airbus A319-100 LX: 5 aircraft, 138 seats, 3,350 km range



Bombardier CS100 LX: 5 aircraft, 125 seats, 2,750 km range



Avro RJ100 LX: 8 aircraft, 97 seats, 2,150 km range



Airbus A340-300 WK: 1 aircraft, 314 seats, 11,850 km range



Airbus A330-300 WK: 2 aircraft, 315 seats, 10,000 km range



Airbus A330-200 WK: 1 aircraft, 275 seats, 10,800 km range



Airbus A320-200 WK: 6 aircraft, 174 seats, 4,050 km range

## Austrian Airlines



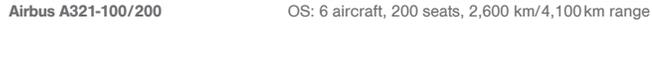
Boeing 777-200ER OS: 5 aircraft, 308 seats, 12,100 km range



Boeing 767-300ER OS: 6 aircraft, 214 seats, 10,250 km range



Airbus A321-100/200 OS: 6 aircraft, 200 seats, 2,600 km/4,100 km range



Airbus A320-200 OS: 18 aircraft, 168 seats, 4,150 km range



Airbus A319-100 OS: 7 aircraft, 138 seats, 3,350 km range



Embraer 195 OS: 10 aircraft, 120 seats, 2,300 km range



Fokker 100 OS: 8 aircraft, 100 seats, 2,100 km range



Fokker 70 OS: 3 aircraft, 80 seats, 2,250 km range



Bombardier Q400 OS: 18 aircraft, 76 seats, 1,350 km range

Range indicated in general with maximum number of passengers or payload, respectively.  
In part, different versions are in operation.

- Legend**
- |                         |                 |                        |
|-------------------------|-----------------|------------------------|
| 4U = Germanwings        | EW = Eurowings  | LX = SWISS             |
| CL = Lufthansa CityLine | LH = Lufthansa, | OS = Austrian Airlines |
| EN = Air Dolomiti       | Lufthansa Cargo | WK = Edelweiss Air     |

# Corporate Responsibility: Prizes, awards and indices

Every year, the Lufthansa Group and the Group companies receive numerous prizes and awards. Here is a selection of those related to the topic of Corporate Responsibility:

## 2016

- The US trade publication Air Transport World honored the partners of the initiative E-PORT AN, which includes the Lufthansa Group, as **Eco-company Partnership of the Year**. It thus acknowledges their pioneering role and their commitment to more electromobility on the apron.
- San Francisco Airport honored Lufthansa as **Quietest Overall Airline**, an award that is given in the context of the “Fly Quiet Program”. The airport’s Round Table Initiative praised above all the airline’s efforts in the areas of fleet modernization and noise reduction.
- For its analysis software OMEGA, which it jointly developed with IT company Aviaso, Lufthansa received the **Innovation Award of German Aviation** in the category emissions reduction.
- The City of Los Angeles certified Lufthansa Cargo’s local station as a **Green Business**. The certification, which will be valid until March 2019, proves that the logistics specialist’s operations in Los Angeles are in accordance with sustainable principles and use resources sparingly.
- Wholly-owned Lufthansa Cargo subsidiary Jettainer and Cologne University make a contribution to more efficient ULD planning through the big-data joint project “Decision Support System”: as a result, the transportation of empty loading containers can be avoided. The project came in second at the **German Logistic Awards** and qualified as a finalist for the **IATA Air Cargo Innovation Awards 2017** and the **German Innovation Award**.
- The Health Management of Swiss International Air Lines received the **Health Award of Foundation for Health Promotion Zurich 2016**. Since 2015, the airline has also held the **Friendly Workspace** label.
- Since 2005, Austrian Airlines has participated in the environmental initiative ÖkoBusinessPlan of the City of Vienna. It supports companies in implementing ecologically and economically relevant measures. As in the preceding years, the airline again received the coveted **ÖkoProfit award** for numerous projects in 2016.
- Austrian Airlines was again named European champion in service in 2016: For the third time in a row, the airline won the title **Best Airline Staff Service in Europe** at the renowned Skytrax World Airline Awards 2016, which includes both cabin and ground personnel.

- At the Future Business Austria Infrastructure Symposium, Austrian Airlines received the **Infrastructure Award Red Arrow** for the company’s strategic development and its contribution to securing the hub function of Vienna’s Schwechat Airport. The award has been given once a year since 2007 to companies, individuals and institutions for particularly noteworthy initiatives concerning Austrian infrastructure and the business location Austria.
- The Austrian Federal Ministry of Science, Research and Economy awarded the State Prize **KnewLEDGE 2016** for exemplary intracompany continuing education measures and honored the personnel development program of Austrian Airlines with second place.

## 2017

- Lufthansa Cargo was rated by DHL Global Forwarding with four “green aircraft” as preferred carrier and awarded the **GoGreen Carrier Certificate**.
- With the project “OMEGA – CO<sub>2</sub> Reduction on the Basis of Big Data” Lufthansa Cargo won the **German Award for Excellence** of audit company DQS in the Environmental Responsibility category. At the **German CSR Prize**, the company reached the finals with OMEGA in the category CO<sub>2</sub> avoidance as a contribution to climate protection, together with two other companies.

**In 2016 Deutsche Lufthansa AG was listed in the following sustainability indices and received the following ratings:**

- FTSE4Good
- ECPI EMU Ethical Equity
- ECPI Euro Ethical Equity
- ECPI Euro ESG Equity
- ECPI World ESG Equity
- MSCI Global Sustainability Index Series
- oekom Prime Rating
- With a climate scoring result of “B” in the CDP Climate Change Report 2016, Deutsche Lufthansa AG has achieved the status “Sector Leader Transportation” in the DACH region. The Group thus ranks among the industry’s best in Germany, Austria and Switzerland.

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