THE AIRBUS way

ENVIRONMENT

AIRBUS

Contents

CEO Statement

> *Society's demand for air transport is growing, and this must be reconciled with responsible activity that minimises the environmental impact of this growth.*

Welcome to Airbus' second Environment, Health and Safety (EHS) report. Within this report you will find a complete overview of Airbus' EHS actions and achievements of the past two years. Over this period, our workforce and our infrastructure have significantly increased in line with our ambitions as we gear up to a new landmark in aviation, the commercial debut of the A380, which is planned for 2006.

The events of the past two years – with SARS, terrorist attacks and conflict in Iraq – have created an extremely tough operating environment for the commercial aviation market. Nevertheless, EHS issues have remained high on Airbus' agenda and during this time we have worked hard to implement our EHS policy and to achieve a continual improvement in our performance.

For example, in 2003, we launched the first phase of an Environmental Management System, according to the ISO 14001 standard, with the ambitious goal of obtaining a global company certification by 2006. I fully rely on this project to nurture an environmental culture within our company and to fully integrate environmental considerations in all aspects of our activities and our products. And I am very confident that we are on track to succeed.

Overall, I hope this report helps you to understand our vision for the environmental issues that surround the aviation industry. We need to ensure a sustainable future for our industry, our people and our planet. Society's demand for air transport is growing, and this must be reconciled with responsible activity that minimises the environmental impact of this growth.

As you will see, through a strong spirit of partnership, and through innovative programmes like the A380, Airbus is paving its way towards a sustainable future.

Noël Forgeard
President and Chief Executive Officer, Airbus

About Airbus

In 2003, Airbus became the world's leading aircraft manufacturer in terms of both sales and deliveries for the first time. This success is underpinned by an international organisational structure and a management approach based on decentralised decision-making and responsibility.

A market leader

Airbus designs, manufactures, sells and supports the most modern and comprehensive aircraft family on the market. With a turnover of €19.2 billion in 2003, Airbus consistently captures half of all commercial airliner orders and continues to broaden its product range by applying existing expertise to the military sector. Since entering the market in 1970, Airbus has sold over 5,000 aircraft to more than 180 customers and today, thanks to a dedicated global team of some 50,000 employees, has over 3,300 aircraft in service with more than 200 operators.

A global approach

Airbus is a truly global enterprise with wholly owned subsidiaries in the United States, China, and Japan, spare parts centres in Beijing, Frankfurt, Hamburg, Singapore and Washington, training centres in Beijing, Toulouse and Miami, and 175 field service representatives around the world. While Airbus' engineering and manufacturing activities are managed centrally, highly-effective cross-functional and transnational teamwork draws together skills and expertise from 16 sites across France, Germany, Spain and the UK, a satellite design office in North America and a joint-venture engineering centre in Russia (see page 44). Each manufacturing site produces a complete section of the aircraft, which is then transported to Airbus' final assembly lines in Toulouse and Hamburg.

Airbus' success is also the result of close industrial co-operation and effective partnerships with major companies around the world, including some 1,500 suppliers in 30 countries. With its headquarters in Toulouse, Airbus is jointly owned by EADS (80%) and BAE SYSTEMS (20%).

An innovative and flexible product range

Airbus' product line is divided into four aircraft families: the single-aisle A320 Family (A318/A319/A320/A321), ranging in capacity from 107 to 185 seats; the wide-body A300/A310 Family (220-266 seats); the long-range A330/A340 Family (253-380 seats); and the high-capacity A380 Family (555 seats). Airbus aircraft share the highest possible degree of commonality in airframes, on-board systems, cockpits and handling characteristics, which significantly reduces operating costs for airlines. Throughout 2003 the product line continued to expand, offering an increased level of choice and flexibility to both the commercial and military aviation sectors.

A318
The A318, smallest and newest member of the Airbus Family, was certified in May 2003 and went on to successfully enter service in July with Frontier Airlines, based in Denver, Colorado. The aircraft was launched in April 1999 to meet airline needs at the smaller end of the market for low-density, high-frequency operations.

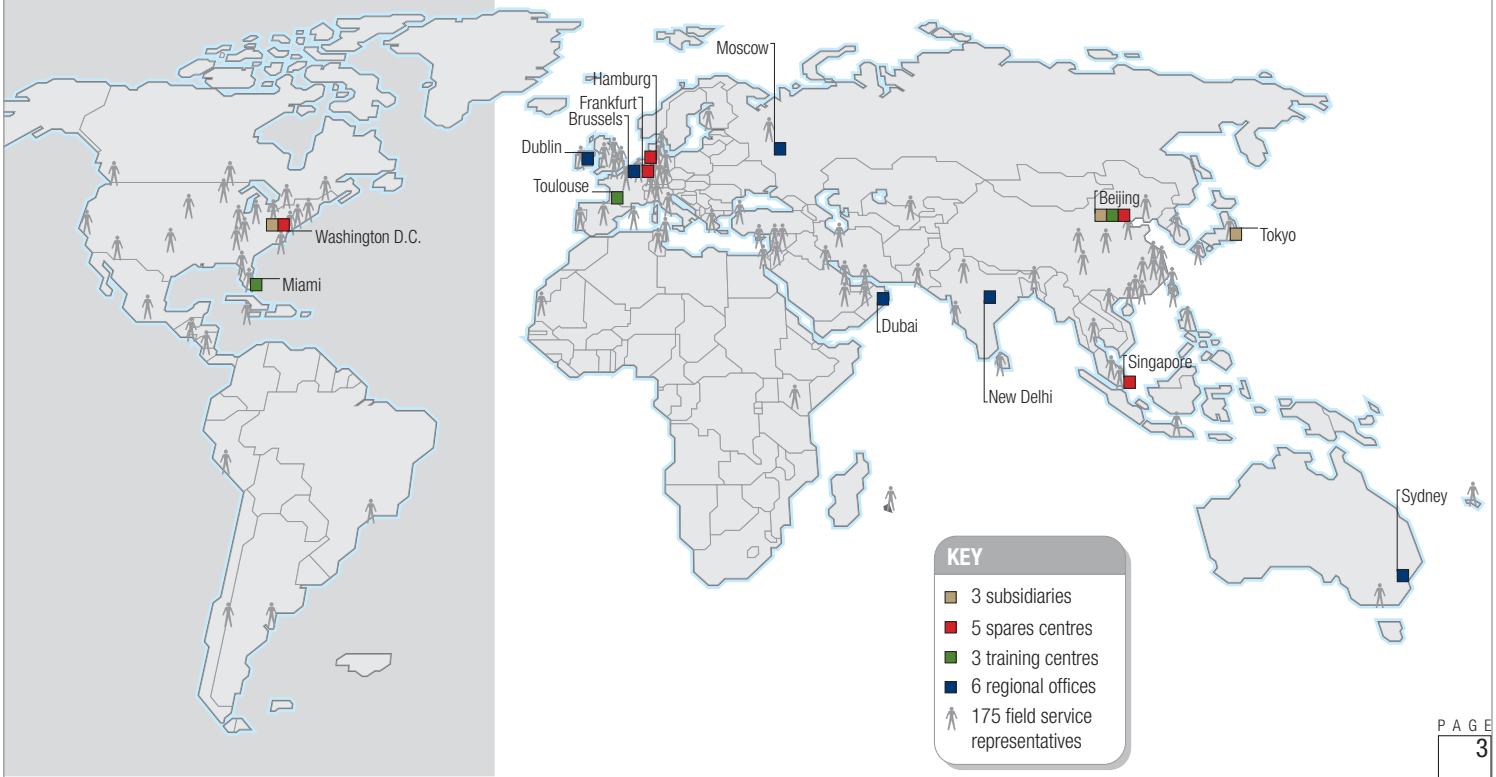
A340-500
The ultra-long-range A340-500, the sixth member of the A330/A340 Family, was awarded type certification in December 2002, before entering service with launch customer Emirates in October 2003. With the longest range of any commercial aircraft, the A340-500 is enabling operators to open new non-stop routes – such as from Dubai to Australia or North America – making journeys shorter, more convenient and more comfortable.

A380
There was significant progress on the A380 programme throughout 2003, with the start of major component assembly at sites across Europe and the attainment of a number of major milestones, including the construction of new facilities and transportation testing. Launched in December 2000, the 555-seat, double-deck A380 will enter airline passenger service in 2006.

Airbus Military
May 2003 saw the formal launch of the A400M programme, following the completion of contracts on behalf of the seven NATO customer nations, and the confirmation of suppliers for aircraft's engines and propellers. Then, in August, the programme's quality plan was delivered to customers, ahead of schedule.

For more information, including news and recent developments on all Airbus programmes, please visit our web site at http://www.airbus.com

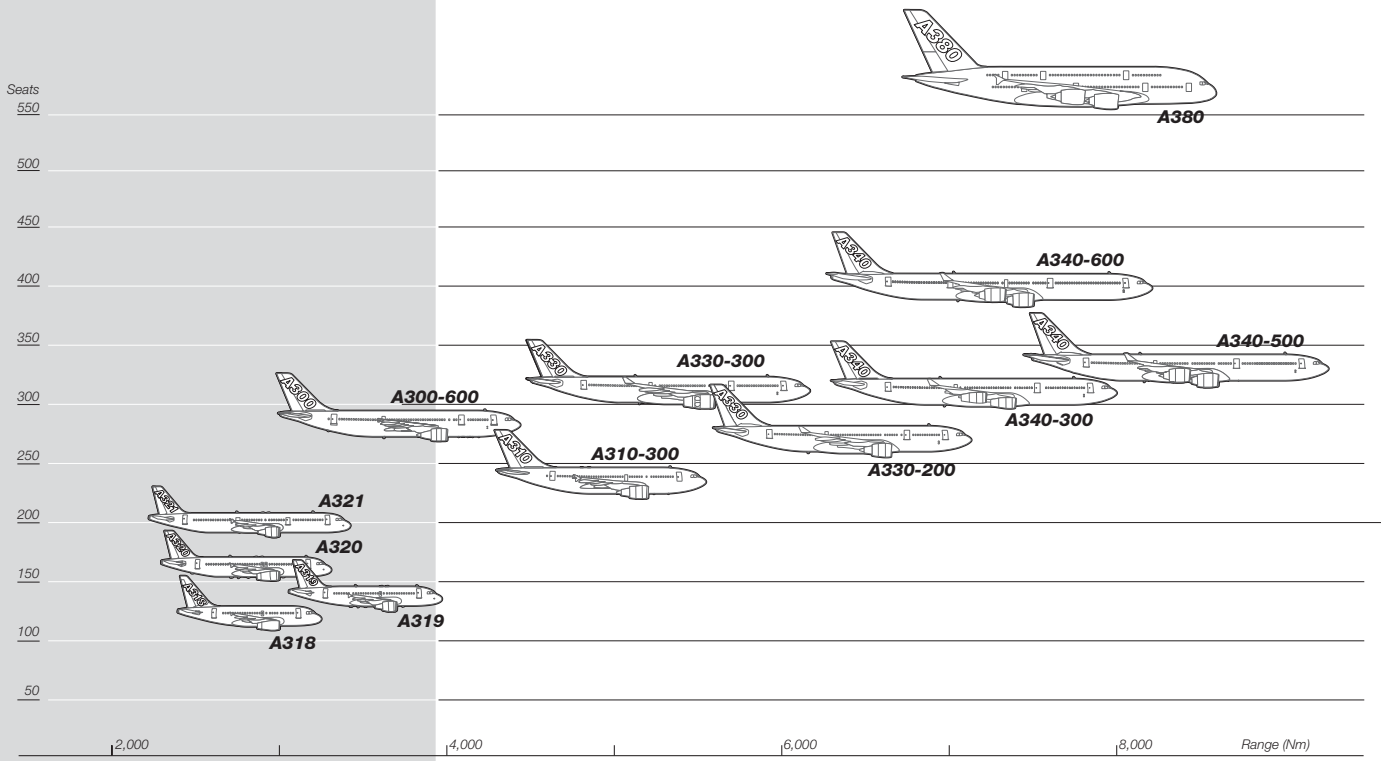
Airbus' presence around the world



Key figures

Year	2002	2003
Turnover (billion €)	19.5	19.2
Orders	300	284
Deliveries	303	305
Order backlog	1 505	1 454
Number of employees	46 300	49 195

The Airbus commercial product line



Working **together** with our stakeholders

As with any major company, Airbus' business is influenced by the expectations of a large number of stakeholders. To ensure a good mutual understanding and to efficiently address various complex issues, Airbus nurtures close relationships with numerous local, national and international organisations. This dialogue favours the promotion and implementation of solutions that address Environmental, Health and Safety (EHS) issues in connection with its activities.

Airbus approach to stakeholder dialogue

Environmental perception varies considerably around the world and stakeholders' expectations are evolving rapidly, especially as technological and scientific knowledge deepens with regard to new or emerging issues for which uncertainties remain.
It is therefore essential for an international company such as Airbus to be fully aware of and to understand all stakeholders' expectations.

From international to local considerations

Air transport is an industry with a long life cycle and requires consistent rules and regulations that have been clearly defined at an international level to ensure a level playing field across the industry. Therefore, Airbus strongly supports the International Civil Aviation Organisation (ICAO) in defining this legal framework and provides all necessary data and expertise to the various ICAO working groups. This helps experts from ICAO member states to establish what is technically feasible, at a reasonable cost for a noticeable environmental benefit. In this respect, Airbus recently took over the chairmanship of the Aircraft Noise and Exhaust Emissions Committee (ANEEC), the environmental body of the International Coordinating Council of Aerospace Industries Associations (ICCAIA) and is, therefore, the official observer for manufacturers at the ICAO for the period 2004-2007.

To keep a close relationship with its customer airlines and to advise them on how to operate its aircraft in the most efficient way, Airbus organises regular operational conferences. There is a full conference every two years — the last one was in Rome in March 2003 — and regular liaison meetings. Environmental and fuel reduction considerations are important items for the agenda and Airbus intends to use these different forums to improve awareness of environmental protection issues.

At a local level, Airbus is involved in various committees that discuss environmental issues close to our manufacturing sites. In particular, because the Toulouse site is involved in flight testing (see page 28), Airbus actively participates in the "Commission Consultative de l'Environnement" of the Toulouse Blagnac airport, a working group that exchanges information and evaluates possible development projects. For instance, as a result of more than 30 meetings over three years, Airbus, as an operator of the airport, committed to adhere to the 35 actions included in the airport "charter" published in 2003.

"On fast-evolving issues such as the environment, even more so than for other matters, communication is one of the key elements for success. For Airbus, having internally efficient environmental communication is essential to guarantee a full understanding of what is really at stake for our business; externally, it facilitates the dialogue with our different stakeholders and helps build mutual confidence."

Philippe Delmas,
Executive Vice-President,
Government Relations, Communications and External Affairs

Employees

A company able to provide good working conditions, promote social dialogue and favour personal development.

Carries internal surveys. Organises environmental awareness and training events. Keeps EHS at the heart of internal communication.

Society

A company able to deliver economic and social benefits to airport neighbours, people living around industrial sites and society at large in an environmentally responsible manner.

Integrates environmental considerations at the earliest stage in aircraft design and manufacturing processes. Exchanges information in public events. Organises site visits.

Customers

A company able to provide the best available technology in order to enhance performance and meet increasingly stringent environmental standards, while maintaining a good aircraft residual value.

Studies and integrates customers' preferences. Offers strong customer support. Organises customer days and information meetings.

Shareholders

A company able to deliver financial performance while, ensuring sustainable growth and building stakeholders' confidence.

Provides timely and reliable information.

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Passengers

A company able to produce aircraft offering a safe, reliable, high-quality service together with a quiet and comfortable cabin environment.

Collaborates strongly with airlines to meet passengers requirements.

Authorities

A company able to
– act proactively in the process to set regulatory environmental standards;
– provide appropriate information in this process;
– ensure continuous EHS improvements.

Work in close co-operation with scientific community. Provides data and expertise and inform on technical possibilities and improvement availabilities on EHS issues. Support ICAO's role in defining the legal framework.

Airports/Air navigation service providers

A company able to provide modern efficient aircraft, improving community relations, compatible with infrastructure and easing terminal operations.

Involves airports at the earliest stage of plane design. Co-operates with air navigation service providers to define the future system of air transport management.

Suppliers

A company able to provide a clear communication and visibility on its purchasing requirements and expectations.

Airbus procurement contracts require the compliance of the suppliers with all relevant environmental laws and regulations and with Airbus policy on environmental, Health and Safety issues.

Text: Stakeholder expectations
Text: Airbus actions

Airbus' previous Corporate Environmental report was selected as the "Best first-time report" by a jury of multi-stakeholder experts for the French selection participating in the European Sustainability Reporting Awards (ESRA) 2002 contest: these prizes are meant to reward the best reports on environment or sustainable development, based on a series of criteria established by more than 15 accounting institutions all over Europe.

Sharing views

Noël Forgeard
President and Chief Executive Officer, Airbus

Giovanni Bisignani
Director General and Chief Executive Officer, IATA

The aviation industry has just gone through troubled times and is facing growing environmental challenges. What are the key actions and responsibilities for the air transport industry in this context?

■ Giovanni Bisignani

Air transport, even during the worst of times, brings enormous economic, social and cultural benefits to the world. Every year, airlines carry 1.6 billion passengers and 40% of the world's manufactured goods by value. Over 28 million people work directly or indirectly for the industry.

The tremendous challenges that the air transport industry has had to face in the past few years would have crippled a less resilient industry. Airlines have survived by being resourceful and innovative. And it is encouraging to see that passenger numbers have bounced back so quickly in many parts of the world.

■ Noël Forgeard

That is indeed a very good signal – and it is society at large, not only customers and passengers, who benefit from our activities. Obviously, the aeronautics industry generates a huge number of direct and indirect jobs and contributes to local development. For example, the A380 programme will generate more than 200,000 jobs worldwide, including some 145,000 jobs in Europe and thousands of jobs in the USA.

This challenging programme has been made possible thanks to important investments in research and technological improvements. Innovation in aviation is and has always been a key issue, and some achievements bring benefits not only to our sector, but also to other industries, through technology transfer.

■ Giovanni Bisignani

I think that everyone would agree now that substantial and steady progress has been made over the past thirty years in reducing both noise and emissions from individual aircraft and their operations. Fuel consumption in modern aircraft is equivalent to the best new car technology. The benefits of fuel efficiency and other technological improvements have been outpaced, however, by the constant increase in the demand to fly. And we must acknowledge that in spite of our technological progress, the industry does have an impact on the environment. That is why we have to remain engaged in this continuous improvement process.

The entire air transport industry, and airlines and manufacturers, in particular, are fully aware of the need to balance social, economic and environmental objectives in order to secure the well-being of present and future generations. Sustainable development is not an option or an afterthought. It is an integral part of our longterm strategy.

■ Noël Forgeard

Absolutely. We need to have a long-term vision of the air transport system as a whole, especially as we are working in an industry with a very long life cycle. This is why our dialogue with stakeholders is central to a better understanding of everyone's expectations, to a higher degree of trust and momentum, and to our ability

to address key issues. I am delighted that our second Environment, Health and Safety report gives me the opportunity to share my views with you on such important issues.

How are airlines and manufacturers reconciling the growing demand for air transport with the need to mitigate environmental impacts?

■ Noël Forgeard

First of all, the reduction of environmental impact has to start at the source and it is our responsibility, as an aircraft manufacturer, to achieve this. We have already achieved major improvements, in some cases setting standards that do not yet exist in other sectors. Aircraft fuel consumption has decreased by 70% in the past 40 years. Aircraft entering today's fleets are typically 20 decibels quieter than comparable aircraft thirty years ago, which represents 75% less in the level of annoyance. However, we want to maintain a proactive approach to addressing environmental challenges. We should not simply report on our past performance, but also look towards the future. Airbus demonstrates its dedication to this continuous improvement process by investing heavily in new research programmes.

In 2003, for instance, our investment in R&D was as high as €1.8 billion. This is only possible within a clear and stable international regulatory framework and that is the main task of the International Civil Aviation Organisation (ICAO).

■ Giovanni Bisignani

Noël, your point about technological progress and the environmental benefits is fundamental. From an airline perspective, more fuel-efficient aircraft reduce both the direct operating costs and the level of emissions in the atmosphere. And the lower noise levels make for better relations with airport neighbours.

But fleet renewal is only possible if the airline financial situation allows such huge investments. That is why IATA strongly opposes environmental taxes or charges that compromise airline financial health, without bringing any measurable environmental benefit. No one should forget that air transport, unlike other modes of transport, is already paying for the airport and Air Traffic Control (ATC) infrastructure it uses. Industry user charges amount to $US 40 billion per year. Imposing additional taxation would further damage the financial sustainability of the industry, and the travel and freight communities it serves. Sustainable development is about economic and social development, as well as environmental protection.

"We need to have a long-term vision of the air transport system as a whole, especially as we are working in an industry with a very long life cycle."

Noël Forgeard

■ Noël Forgeard

Reduction of fuel consumption has always been a very competitive issue for manufacturers when selling an aircraft. Indeed, fuel burn accounts for a large part of an airline's operating costs and, consequently, they do not like to carry fuel instead of payload. To design aircraft that are economically efficient, manufacturers are doing their best to guarantee that throughout its life cycle, an aircraft will carry the highest possible payload (passengers and/or freight) for the lowest possible fuel load, as defined in safety requirements.

Airbus addresses fuel consumption reduction both through the design of its aircraft and by providing assistance to airlines throughout their daily operations.

■ Giovanni Bisignani

I absolutely agree! Although technology is a key element, it is not enough. Efficient operational practices must complement technological improvements. For example, substantial fuel savings are possible if we can better use the airspace, in particular with Reduced Vertical Separation, better use of Global Navigation Satellite System (GNSS) procedures, and improved air routings. All of these are win-wins. Reduced fuel translates directly into lower costs and lower emissions. This is a global challenge – the airline industry needs governments and Air Navigation Services (ANS) providers to collaborate. To harmonise systems and work together on a global road map for more efficient air traffic management.

Looking further ahead, how do you envision the air transport industry in the coming "environmentally-conscious" future?

■ Noël Forgeard

As you said, improving air traffic management is essential. Nevertheless, in order to accommodate the demand for air travel, there will still be issues with airport capacity. Building additional runways or new airports will become necessary in some cases and the opposition, essentially for environmental reasons, will remain quite strong.

An alternative way to absorb traffic growth is to operate larger aircraft like the A380 and airlines around the world have already clearly demonstrated their confidence in this approach. More generally, environmental requirements remain at the centre of our business and are taken on board as early as possible in the design process. Over half a century can pass from the very early design stages for a new aircraft type to the retirement of the last aircraft of that fleet. So, even at the beginning of the design stage, we must anticipate the future expectations of all stakeholders throughout that 50-year cycle. I think that people will always want to travel, but as part of a society that will be ever more demanding in terms of minimising the impact travel has on the environment.

"From an airline perspective, more fuel-efficient aircraft reduce both the direct operating costs and the level of emissions in the atmosphere."

Giovanni Bisignani

■ Giovanni Bisignani

It is indeed a fundamental issue. Air transport is a key building block for development in regions such as China, India, Eastern Europe, Latin America and Africa. More people are looking for greater mobility, but they are looking for a better environment at the same time. This is a global issue, for all sectors of the industry and for society at large.

The sustainability approach requires all types of transport to be treated equally when assessing their respective environmental impact. The aviation industry's external costs, such as environmental impact, are already taken into consideration more fully than in any other transport sector. In particular, this includes infrastructure costs.

Having spoken of the passengers' views and future requirements for their travel, what is your idea of the traveller of the 21st century?

■ Giovanni Bisignani

Well, firstly we will be seeing many more travellers – potentially 2,200 million by the year 2010. We will see many more passengers from rapidly emerging new markets in Asia and Eastern Europe. However, the basic passenger expectations will remain the same: people want to fly safely, comfortably and quickly to their destination. Obviously, the price will very much influence their ability to travel. Our future customers will also be more demanding in terms of comfort levels, especially for very long flights. And in terms of the services they get on the ground – particularly making security and government procedures easier.

■ Noël Forgeard

Obviously, there is one issue that we will never compromise on and that is safety. This is true for both manufacturers and airlines. Air transport is, and has to remain, the safest means of mass transportation in the world.

But compromises may influence some other elements. The design of aircraft is optimised in order to ease the workload of crew and traffic management through efficient on board systems. Fly-by-wire technology has been a key element in this exercise and it is important to note that it has had a positive impact both on the environment and on the comfort of passengers. Using wires to carry a signal instead of cables and pulleys has substantially reduced the weight of the aircraft and, therefore, the amount of thrust needed to fly it. This has consequently reduced the associated fuel consumption. The use of fly-by-wire has also allowed smoother flight paths, thereby improving the comfort of passengers and the safety of flight.

■ Giovanni Bisignani

Our remarkable safety record is essential to our success as a transport industry. And, with new targets for further improvement in safety levels, this focus will continue. But, as with safety, we have not neglected our environmental objectives and are actively working with our partners in the ICAO framework on improving technical standards, promoting more efficient flight operational procedures and assessing the feasibility and effectiveness of market-based incentive mechanisms, such as emissions trading.

■ Noël Forgeard

It is essential that all providers of air transport (manufacturers, airlines, airports, traffic management and even professionals in tourism) talk together to define the most suitable solutions. For instance, airlines are certainly the main stakeholder in terms of understanding passenger expectations and we, as a manufacturer, are in very close communication with airlines and their associations to ensure that we understand how we can continuously improve flight performance. My feeling is that no one provider can tackle the environmental challenge alone. This is a joint responsibility and must be a collaborative task.

■ Giovanni Bisignani

If you allow me to conclude, I would like to paraphrase you in saying that "we are all in the same boat", or indeed on the same aircraft!

A380: designed in close co-operation with industry partners

Given the unique nature of the A380's size, Airbus set up a team dedicated to airport compatibility aspects (including environment) as early as 1994, 12 years before the aircraft's planned entry into service.

Taking a longterm view, today's fleet mix and our increasingly congested major airports will struggle to accommodate the forecast growing demand for passenger and freight traffic. This market analysis, together with the need for mitigating environmental impacts, has emphasised the need for a long-range, high-capacity aircraft, operating on hub routes with low cost, great comfort and environmental performance, and complementing point-to-point operations offered by the existing A340 Family. Designing such an aircraft was the challenge that Airbus decided to take up.

Airbus initiated a pro-active approach by organising numerous working groups and open forums with airlines[1], airports[2], ground handling companies, and regulatory authorities.

With the A380, Airbus has adopted a new approach, in order to involve its suppliers at an early stage in the design and development of the aircraft. As a result, engineering resources from the suppliers joined Airbus design teams on a "design plateau phase".

Given the unique nature of the A380's size, Airbus set up a team dedicated to airport compatibility aspects (including environment) as early as 1994, twelve years before the aircraft's planned entry into service. Many recommendations received during these consultations have directly shaped the design of the A380, which will be compatible with most airport requirements for reduced adaptation investments.

While designed to have substantial margins within existing international environmental standards, the A380 encountered one of its main challenges with the requirements from customer airlines to meet the QC/2 departure classification necessary to take off from London airports at night. This will be achieved through the incorporation of new technologies resulting from extensive research programmes. For instance, Airbus designed a nacelle acoustic liner that is manufactured as a single barrel (zero splice inlet barrel) as opposed to the classical two or three panels, thus removing the acoustic disturbance created by the joints (splices) between the liner panels.

As a result, the A380 is a 560 tonnes MTOW aircraft capable of carrying 555 passengers over 8000 nautical miles, which has been designed with an unprecedented emphasis on environmental aspects.

1) In 1992, an Airbus survey of 10 airlines in Asia, Europe and North America confirmed the need for a new aircraft seating up to 600 passengers and compatible with existing airport infrastructures.

2) Sixty airports "likely to welcome A380 before 2010" were invited to contribute at this consultation phase.

Managing the Environment, Health and Safety

Airbus is fully committed to the continuous improvement of the Environmental, Health and Safety performance of its sites and products through the design and maintenance of effective management systems. The company firmly believes that the involvement of every employee is essential to ensure the permanent control of industrial risks and the highest standards of occupational safety at all levels of the company.

The Airbus EHS Policy

The Policy on Environment, Health and Safety is one of Airbus' key documents and is made readily available to all Airbus employees.

Commitments

- We go beyond the mere fulfilment of the legal obligations and are committed to the continuous improvement of our performance in all areas of EHS.
- We endeavour to evaluate the impact and risk of every aspect of our activities and products on EHS.
- We set targets for EHS improvements and measure achievements in order to continually improve our performance and face future challenges by all reasonably practical means.
- We research, develop and promote innovative solutions with the aim of improving our EHS performance over all phases of the product life cycle for the benefit of all our stakeholders.
- We promote and uphold a high level of care for the health and well-being of our employees and we involve our employees and staff representatives in the layout of their workplace and other EHS activities.
- We design work systems, products and services according to health, safety, ergonomics and environmental requirements in all phases of the product life cycle.
- We assess potential actions for improvement and engage in appropriate legislative review processes and actively participate in stakeholder forums.
- We make our stakeholders and the public aware of our EHS Policy and provide comprehensive information about the protection of EHS.
- We provide our employees with appropriate training. We foster an EHS culture and encourage personal initiatives.
- Our subcontractors' and suppliers' commitment to respecting this Airbus Policy is a relevant criterion for their selection.
- The involvement of all employees, not only the management, in the adoption and implementation of this Policy, is an important criterion in the evaluation of individual performance and results.

Implementation

- All Airbus Functions, National Entities and Subsidiaries are responsible for the consistent implementation of this Policy.
- They guarantee the establishment of appropriate implementation directives and the availability of the necessary resources, especially with regard to personnel and the suitability of their skills for the job.
- Periodic assessments will be performed on a worldwide basis to monitor the implementation of the EHS Policy.
- This Policy will be reviewed regularly in accordance with the Airbus Strategic Plan.

"The expansion of the company directly depends on its economic results and on the continuous improvements of its performance in all fields. In this context, both mental and physical health, safety in the workplace, as well as the respect for the environment in Airbus activities, including product design, constitute an integral part of the company's fundamental performance and business decisions."

Bill Black,
Executive Vice-President
Quality and Integration

EHS organisation

The implementation of the Airbus EHS Policy is based on an efficient organisation and the involvement of the whole company, thanks to a clear definition of the missions and responsibilities.

Airbus' corporate environmental affairs team is in charge of environmental issues while human resources is responsible for Health and Safety issues. Environmental affairs and human resources teams work together to implement and update Airbus' corporate EHS Policy. They report to highest executive levels of the company and work closely with all functions to ensure the consistent integration of EHS measures in all Airbus' activities throughout the life cycle of its product.

Each Airbus entity, subsidiary and function is responsible for implementing the EHS Policy and contributing to the achievement of environmental goals. An EHS steering committee comprising key functional and entity representatives has also been set up to approve strategic orientations for EHS issues.

Environmental, Health and Safety officers are appointed and empowered at all Airbus manufacturing sites to manage EHS issues at a local level, with additional support from colleagues in operational services.

Key figures

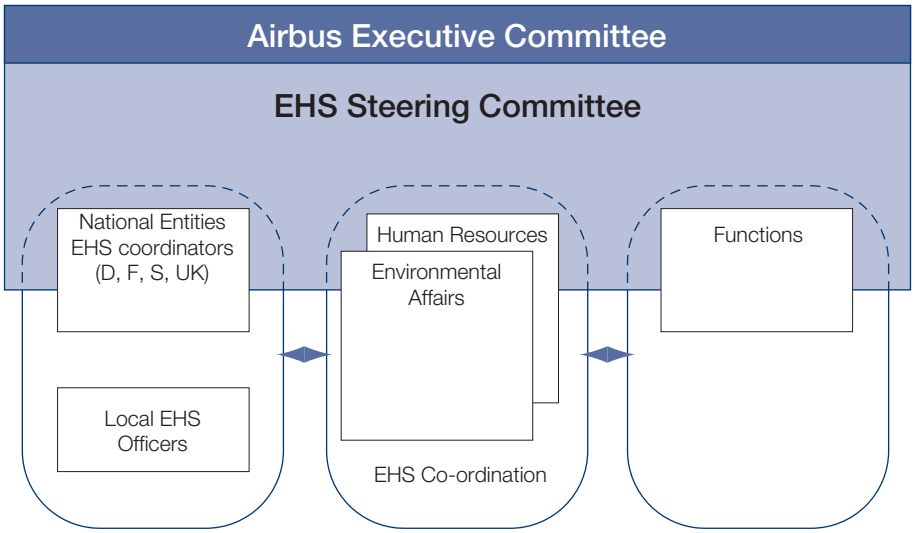
More than 130

people dedicated to environmental issues

1 two-day environmental meeting every two months

3 two-day Health and Safety meetings per year

Promoting EHS Policy at Saint-Éloi (France)



Airbus ISO 14001 network

EMS implementation

Environmental considerations have always been a key priority in the management of Airbus activities. The implementation of appropriate environmental management systems ensures Airbus' constant progress towards achieving environmental excellence.

"ISO 14001 is not about a certificate on the wall; it is about a progressive, dynamic and breathing business with a clear vision and strategy to become world class. EMS affects everyone on site and all employees have their part to play in a programme of continuous improvement."

Liz Anderson,
ISO 14001 management representative at Filton site, UK

In December 2002, the site at Filton in the UK became the first Airbus location to achieve ISO 14001 certification, covering all aspects of the business that affect environmental performance.

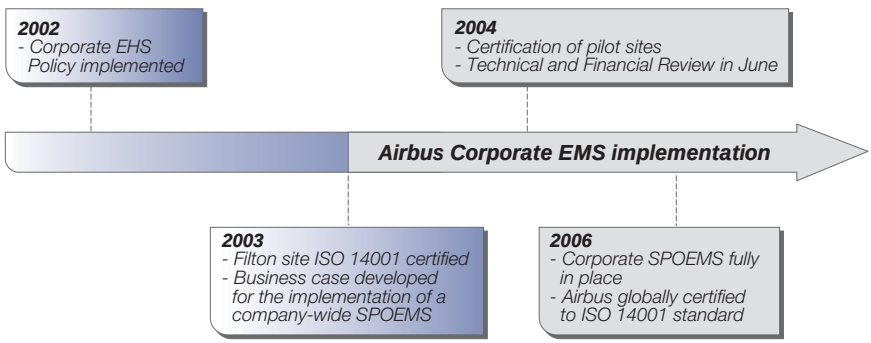
In agreement with the commitment taken in 2002, Airbus is evaluating plans to develop and implement a company-wide **Site and Product Oriented Environmental Management System (SPOEMS).**
This will cover the full life cycle of its products and will be compliant with ISO 14001 requirements. The objective is to achieve overall corporate ISO 14001 certification by 2006.

A first phase was launched in 2003 for the manufacturing activities of five pilot sites around Europe.

These sites, at Broughton in the UK, Nordenham in Germany, Puerto Real in Spain and Saint-Eloi and Saint-Nazaire in France, aim to achieve ISO 14001 certification by the end of 2004.
In this process, the Broughton site successfully passed the certification audit in April 2004.

On the basis of the experience gained in the first months of this pilot phase, and as a result of a technical and financial review scheduled for June 2004, Airbus will then decide on the way forward.

Airbus Corporate EMS implementation



Training and awareness

Employee training and awareness of environmental, health and safety issues are the first key elements in the successful implementation of the EHS Policy and associated management systems. Specific EHS training is provided to support their commitment and help achieve the maximum levels of active contribution.

Indicators

Health and Safety training hours	2003
France	37 500
Germany	26 008
United Kingdom	26 507
Spain	18 854
Central entity	1 444
Total	**110 313**

Targets

To enhance environmental communication, particularly in the frame of ISO 14001 programme.

To train 100% of the on-site environmental focal points to ISO 14001 requirements by the end of 2004.

In-the-field awareness sessions are conducted to ensure that EHS best practice is integrated into routine operations. The training is also provided to external and on-site contractors prior to any active involvement with Airbus. At a global level, an extensive environmental awareness programme throughout Airbus is under way, along with a more specific training programme for dedicated teams. Various communication tools are used for this programme to ensure the most effective targeting of each audience, including the introduction of two new applications.

■ A centrally integrated ENvironmental Reference On-line Library (ENROL) provides employees with easy access to all of Airbus' EHS information. This supports Airbus' drive to ensure that effective company-wide information sharing is used to support decision makers throughout the product life cycle.

■ A dedicated "environmental channel" is available through the company's employee portal facility, Airbus/People. This channel provides news and information concerning the objectives, activities and people that form the backbone of Airbus' environmental network. The environment channel is also closely linked to other channels, sites and documents on the portal.

Screen view of environmental channel

Case studies

■ In Germany, Hamburg hosted an EHS rally that brought together 140 trainees and apprentices, in 16 workshops designed to raise awareness of EHS issues.

■ In France, all environmental managers benefited from a one-day training on environmental regulations. Around 40 environmental "focal points" attended specific environmental training in 2003 and they will in turn provide on-site training and support to other employees.

■ In the UK, the Filton site provided over 13,500 hours of safety training to more than 2,400 employees focusing on Health and Safety management, including some 3,400 hours for over 300 managers. It also incorporated 5,198 hours of emergency training for 418 employees, over 1,900 hours of risk assessment training for 272 employees, and over 3,000 hours of general safety and risk awareness for 1,473 employees.

EHS risk management

EHS risk management is an integral element of Airbus' key procedures, ensuring that all significant risks are identified, managed and reported in an appropriate manner.

Risk assessment

Within the framework of the European regulation on Integrated Pollution Prevention and Control (IPPC), all Airbus manufacturing sites have performed risk assessments and mappings. New evaluations are carried out when a significant change is made at a facility. Each event is analysed and the lessons learned are taken into consideration in order to further optimise control measures.

Potential risks and hazards to health and the environment, which can be associated with the use of hazardous materials and substances in aircraft design and manufacturing operations, are also systematically screened.

Airbus has set up in-house national hazardous substance committees that are responsible for the approval of any new chemicals that are to be introduced on site or in the manufacturing process.

Risk management

Airbus' commitment is to reduce risk as low as reasonably practicable:

■ A number of directives and procedures are in place to organise responsibilities at operational levels and ensure that risk reduction is a shared priority among employees.

■ Consistent training is provided. In particular, special attention has recently been given to the transportation of hazardous materials.

■ The company seeks to reduce risks at the source rather than simply identify them at the end of the process. Going far beyond regulation, Airbus is voluntarily promoting the reduction of all hazardous substances through phase-out and substitution schemes and through the development of clean technologies.

Reporting

An integrated tool allowing hazardous substances to be tracked is being implemented groupwide. It will make it possible to monitor the flow of hazardous substances from purchase to recycling or elimination, including the transportation phases.

Case studies

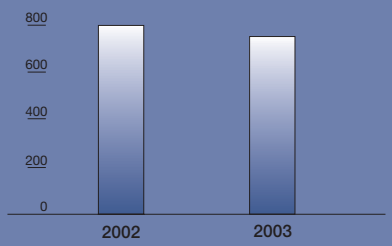
■ As part of Airbus' continuous effort to improve EHS and eliminate hazardous products, the UK team successfully discontinued the use of all two-part chromium VI containing sealants at its own manufacturing facilities in Filton and Broughton, as well as with its major subcontractors.

■ In France, the Toulouse A380 final assembly line benefits from an innovative and reliable fire risk prevention approach. Following a detailed risk analysis, the fire protection was defined in order to ensure complete protection of a 9,000 m^2 area thanks to water deluges or emulsifiers set up in the halls, foam guns on the outside areas and sprinklers at the other buildings.

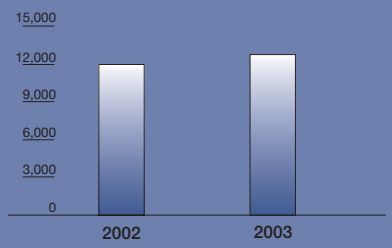
Occupational safety

Airbus continually strives to identify and prevent potential occupational risks to ensure that all employees and operators are working in a safe environment.

Indicators



Number of reportable accidents



Number of days lost due to accidents > 3 days

Key figure

0 fatal accidents in 2003

Targets

To pursue the harmonisation of H&S reporting systems.

From 2005 onwards, to conduct a yearly assessment of EHS Policy implementation.

Following the definition of the joint EHS Policy in 2002, an initial Policy Implementation Assessment was carried out in 2003 to determine the point where each entity stands and set consequent priorities.
On that basis Airbus started a target-setting process for occupational H&S for all entities and levels. Topics such as H&S organisation, assignment of H&S tasks and duties and qualification of all the ones involved were examined. Where necessary, improvements were identified, and entities have launched some preventive and corrective actions focused on:

- the integration of safety and ergonomics in the design of workplaces, industrial processes and facilities. For example, Polaris 2, the new assembly line for A380 in Saint-Nazaire, France, has been using the most recent and innovative approaches to ensure optimal light, noise and safe work conditions;
- the direct involvement of our employees and management through appropriate training.

In spite of the tremendous activity connected with the development of the A380 programme, the number of reportable industrial accidents was considerably reduced in 2003. However, the resulting lost time did not follow this trend because of a few serious accidents. Human behaviour was found to be the main cause for these accidents, and so the 2004 plan of action now includes dedicated occupational safety training for staff and management.
To ensure further continuous improvement, a Policy Implementation Assessment will be held every year from now on. As a result, each entity will set yearly concrete objectives. Internal and external benchmarking and sharing of best practices will also remain among our continuing objectives. In the future, Airbus' subcontractors will also be included in this process.

"As a further step towards implementing our joint EHS Policy, numerous activities were initiated in 2003 with the aim of improving workplace safety but also of promoting integration of the entities and making our processes more efficient. The resultant increased transparency in the H&S sector as a whole contributes to the process of continuous improvement."

Erik Pillet,
Executive Vice-President,
Human Resources

Case studies

- From November 2002, Airbus Deutschland has initiated a health promotion project aiming at setting Health and Safety standards in comparison with other enterprises. In 2003, after analysing the current situation at all sites, the health promotion strategy was prepared and presented to the site co-ordinators. From 2004, five key figures will be used and reported at each site to measure the results and success of workplace health promotion.
- In 2002, Airbus Spain implemented two medical protocols in the fields of stress management and musculo-skeletal injury aiming at a better detection of potential illnesses and consequent earlier preventive or healing measures.

Measuring our **progress**

Over the years, Airbus has constantly improved its environmental performance through research into new clean processes, materials and technologies and by designing aircraft that minimise overall environmental impacts across their entire life cycle.

- Consumption of raw materials and natural resources (water, energy)
- VOC emissions from cleaning and painting processes
- Direct GHG emissions from consumption of natural gas and fuel
- Indirect GHG emissions from electricity consumption
- NOx and SOx emissions from combustion facilities
- Production of hazardous and non-hazardous waste

Air transport key environmental impacts

Manufacturing

- Use clean technologies and new processes with lower environmental impacts (e.g. solvent-reduced or solvent-free cleaning operations, low VOC coating processes, and new chemical milling maskants)
- Eliminate and reduce hazardous materials (eg. chlorinated solvents, chromium VI)
- Raise employee awareness of EHS issues
- Promote energy and water savings
- Reduce waste production at source and increase waste recycling rates
- Reduce hazardous waste

Design

- Develop Design For Environment (DFE) procedures and tools
- Incorporate EHS criteria into design of new buildings and processes
- Assess EHS impacts prior to any investment or procurement
- Optimise continuously aircraft design to reduce weight, fuel consumption, noise and emissions
- Integrate end-of-life issues from the very start of aircraft design
- Participate to international R&D programme

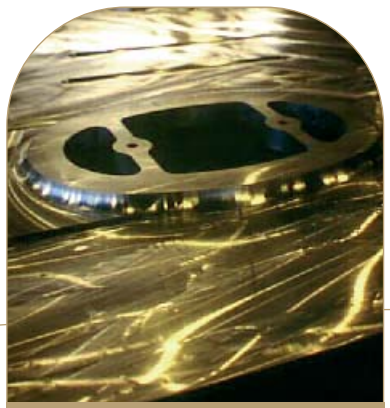
Airbus actions throughout the integrated aircraft life cycle

- Energy consumption (kerosene) to transport aircraft sections from manufacturing sites to final assembly lines in Toulouse (France) and Hamburg (Germany)
- Transport-related emissions (e.g. GHG, NOx, SOx, particulates)
- Employee commuting and travel contributes to local air pollution issues

- Growing demand for air transport putting increasing pressure on non-renewable energy resources
- Noise nuisances around airports
- Aircraft emissions contributing to local air pollution and climate change issues

Transportation

- Maintain an efficient transportation system for aircraft sections minimising environmental impacts (Beluga, multi-modal solutions for A380)
- Organise safer and more efficient shuttles and circulation rules
- Encourage employees to use environment-friendly transport such as car sharing, buses and cycles



Operations

- Provide technical support to airlines and airports in order to optimise operational procedures (fuel burn optimisation, fuel conservation measures, noise abatement procedures)
- Support maintenance processes and consumables

Decommission & recycle

- Co-operate with concerned parties to define aircraft end-of-life strategies

Our mission is to deliver a best-in-class product, on time, to cost, with quality and highest environmental performance through innovative manufacturing techniques, lean and efficient manufacturing processes, and close cross functional and cross national team work.

Karl-Heinz Hartmann,
Executive Vice-President,
Manufacturing

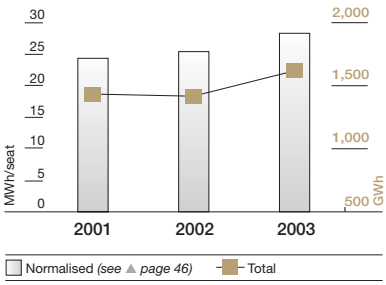
Site performance

Saving energy resources

The depletion of fossil energy sources together with climate change are major sustainability concerns. Airbus aims to streamline energy consumption, while reducing greenhouse gases emissions, through the use of alternative resources or technologies and the modification of consumption habits.

Energy

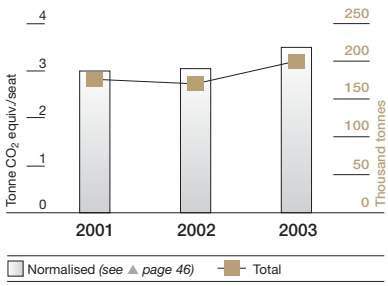
Airbus' overall energy consumption has slightly increased from 2001, due to the extension of manufacturing facilities to accomodate new A380 production lines. 58% of the energy currently used by Airbus comes from gas, 40% from electricity and 2% from heating oil. Airbus seeks to promote the level of day-to-day energy savings, through increasing awareness and expanding best practice. From the earliest stages of planning, building design and management, Airbus takes full advantage of the latest technology to deliver tangible improvements, by using options such as automatic equipment and light management, raw materials that optimise energy consumption or environmentally friendly energy sources.



Total and normalised energy consumption

Greenhouse gases emissions (GHG)

GHG emissions are mainly generated by the heating and power systems of industrial infrastructure.
In 2003, the direct CO_2 emissions from fossil fuel combustion of all manufacturing sites increased by 18% compared to 2002. This evolution is mainly due to the additional energy consumption as a result of the A380 production programme.
In this context, Airbus continues promoting energy savings efforts and encourages the development of environmentally friendly energy sources to replace non-renewable energy sources.



Total and normalised CO_2 emissions from fossil fuel combustion
(all manufacturing sites)

Case studies

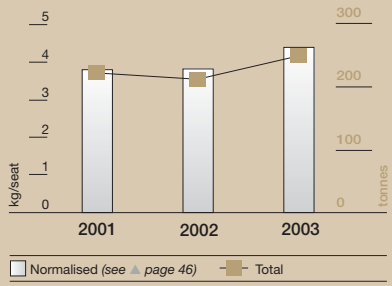
■ Building on past experiences, six Combined Heat and Power (CHP) generating units were set up in October 2002 at Broughton (UK). Generating a total output of 7.2 MW of electricity and 15 MW of heat, they meet all electrical requirements of the wing production process.

■ Airbus Spain plans to construct in 2004 an installation of 98.6 KWatt-peak of photovoltaic solar power connected to the public electricity system on the roof of the new office building in Getafe. The installation will be composed of 580 photovoltaic panels supplying 130 MWh/year to the public electricity system.

Controlling air emissions

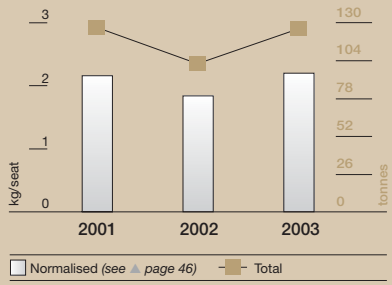
Airbus is committed to minimising and controlling the release of emissions into the air from its industrial processes and infrastructure.

Indicators



Total and normalised NO_x emissions
(all manufacturing sites)

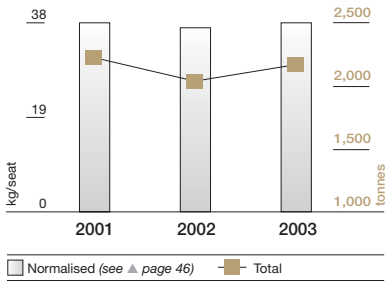
In 2003, the additional fuel consumption due to the A380 production programme led to an increase in NO_x emissions.



Total and normalised SO_x emissions
(all manufacturing sites)

Volatile Organic Compounds (VOC)

Surface treatment and coating operations are significant sources of VOC emissions. Despite the increase in production, Airbus has managed to stabilise VOC emissions by phasing out high VOC-containing chlorinated solvents, developing clean technologies (e.g. cryogenic cleaning), using low-VOC cleaning materials or pre-impregnated wipes and introducing water-based paints. In addition, the automation of painting operations reduces paint wastage and fugitive emissions. All remaining emissions are carefully controlled and treated before being released to the atmosphere.



Total and normalised VOC emissions
(all manufacturing sites)

Ozone Depleting Substances (ODS)

ODS are being phased out in the frame of the Montreal Protocol and EC regulations. Airbus has already eliminated almost all ODS solvents. The only exceptions are a very small number of products used in precision cleaning operations, which are covered by a European exemption for aerospace applications until 2008. In the meantime appropriate alternative technologies will be progressively introduced.

Nitrogen oxides (NO_x) and sulphur oxides (SO_x)

Energy saving techniques and the use of highly efficient combined heat and power systems are used to minimise the level of NO_x and SO_x emissions from combustion plants.

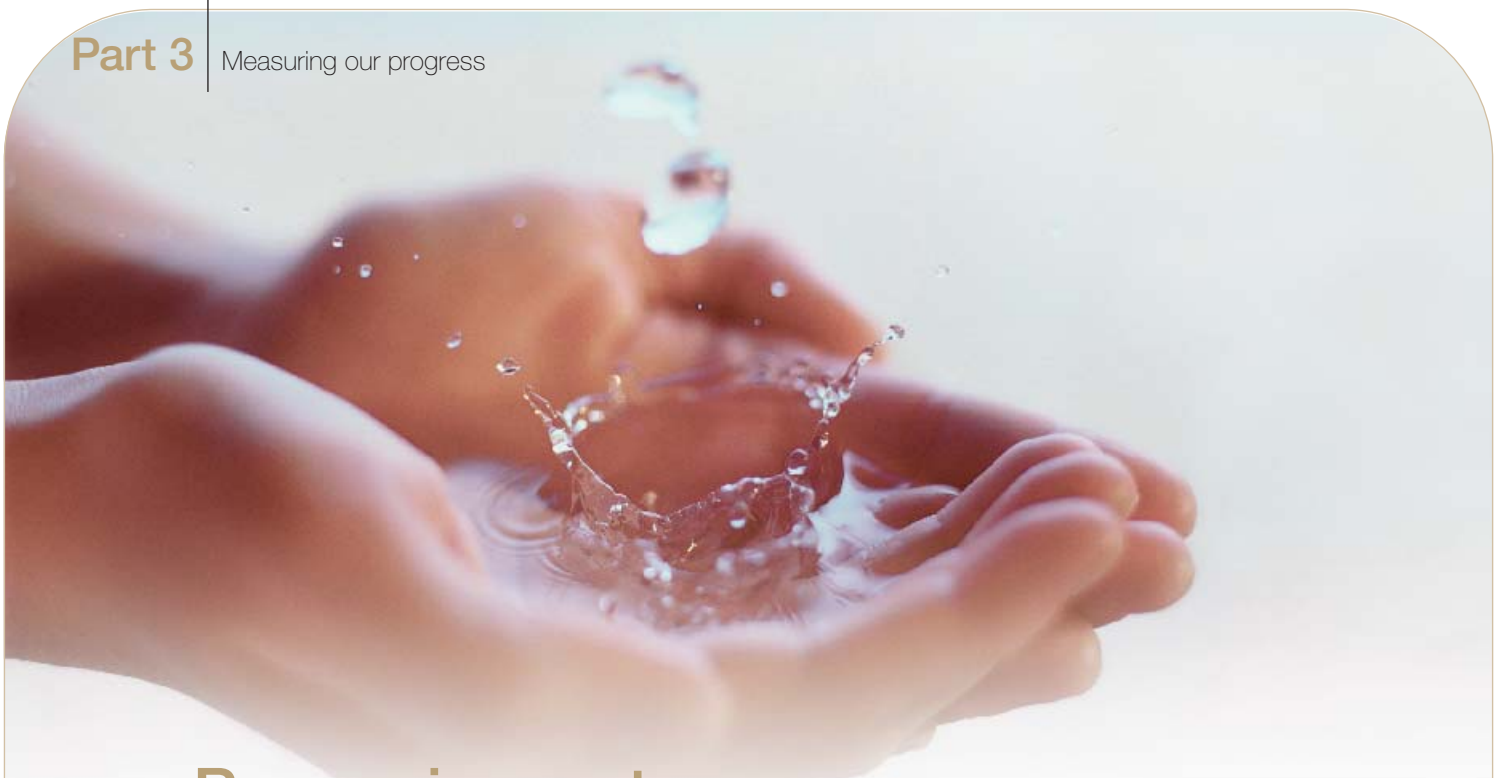
Case studies

■ Airbus Spain team has identified new water-based varnishes to reduce VOC emissions during manufacturing processes. These new materials are being introduced in the production of the new A380 aircraft and will be progressively extended to all other programmes.

■ In Germany, covers introduced on the chemical baths in the Galvanic-Aluminium workshop at the Bremen site are dramatically reducing air emissions and, therefore, the levels of employee exposure.

■ In the UK, the introduction of aqueous technology at the Broughton site has enabled the elimination of trichlorethylene in cleaning wing components and tools, thereby reducing the level of VOC emissions by 25% compared to previous levels.

■ In France, Airbus contributed to the publication of national guidelines on VOC reduction schemes based on lessons learned from implementing such strategies on its own sites. The guidelines have been made public in 2004 for the benefit of all aerospace industry and published on the French Ministry of Environment website as a best practice.



Preserving water resources

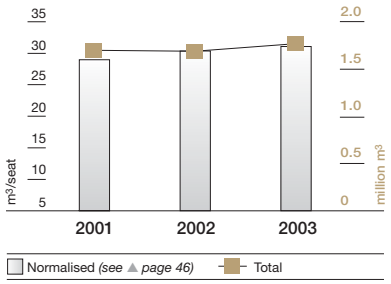
Airbus takes great care to conserve and protect water resources by optimising each step of the water cycle, exerting careful control, from consumption through to discharge.

Water consumption

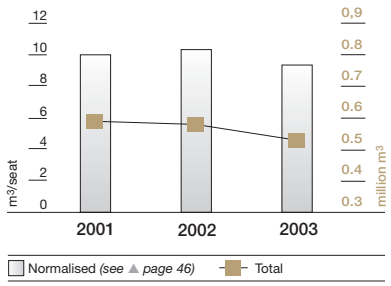
In Airbus, the main industrial processes that use water are surface treatments, non-destructive testing for both metal and composites, and cleaning during assembly. Efficient use and effective recycling systems have consistently reduced water consumption, even allowing for the increased levels of production.
For example, the amount of water in surface treatment activities has been reduced through specific measures, such as limiting evaporation from active baths, by lowering the temperature, or minimising rinse levels as far as possible.
Across the four Airbus sites in France, the level of water consumption has been reduced by nearly 100,000 m³ since 1999, which is equivalent to the annual consumption of a town of 1,500 inhabitants.

Water discharge

Airbus strives to **preserve the quality of water** resources through ongoing control measures and the careful treatment of its industrial effluents. Recently, some sites have been equipped with closed-loop systems with the aim of achieving a zero-discharge level. For example, in Germany, the Varel site has introduced a new filtering process that makes it possible to reuse rinsing water from flaw detection operations on aluminium parts. This has created a 93% volume reduction in the residual oil-water mix.



Total and normalised water consumption
(all manufacturing sites)



Total and normalised water discharges
(all manufacturing sites)

Case studies

■ Although water consumption has increased globally as a result of new programmes such as the A380, Airbus sites in Spain have rationalised their water consumption by changing the processes that had the highest level of water consumption, such as paint booths and surface treatment baths.

■ In the UK, Airbus' Broughton facility has introduced a water re-circulation system as part of the rinse treatment of wing components. This enables 90% of all rinse water to be washed back into the process tank, in turn reducing the level of contamination in the subsequent rinse tanks and, therefore, considerably decreasing the chemical load on the effluent treatment process.

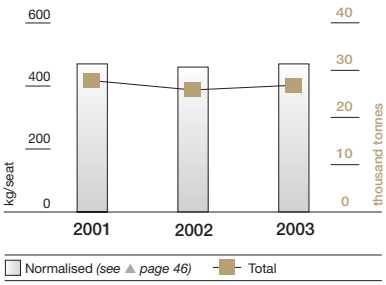
■ At Saint-Nazaire, the rinsing water from surface treatment baths is sent to a vacuum evaporation system that allows the elimination of aqueous discharge. The distillate obtained, of a composition purer than the water (conductivity of 10µS/cm against 460µS/cm), can then be reintroduced in the process.

Optimising waste management

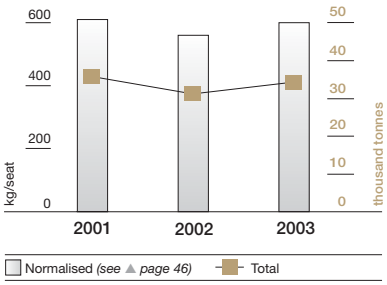
Airbus aims to reduce waste production at source and promotes waste recycling through appropriate segregation.

In 2003 Airbus activities generated 26,863 tonnes of hazardous and 34,355 tonnes of non-hazardous waste. The new A380 production activities resulted in a growth in the global amount of waste produced by 7% between 2002 and 2003, in line with Airbus' expectations.
Airbus continually looks for innovative ways to minimise waste production at source. For example, by working closely with suppliers, it has developed solutions that reduce the amount of packaging, material offcuts and waste production.

The company also seeks to develop new, alternative clean technologies and products, to reduce waste from the very earliest definition of new aircraft or parts.
In parallel to reducing waste levels at source, Airbus promotes recycling through separated collection and invests in the proper training and awareness of all employees.



Hazardous waste production



Non-hazardous waste production

Case studies

■ At Illescas (Spain), the automatic tape layering technology introduced in the manufacture of A320 horizontal stabilisers has reduced composite waste by over 50% compared to previous technology.

■ In France, the development and enlargement plan for Saint-Eloi site included the creation of a "clean area" meant to help organise and improve the gathering and upgrade of titanium and ferrous metals shavings as well as garbage bags collection. This has enabled the recycling of 216 tonnes of titanium and ferrous metals in 2003.

■ Recycling level raised to 93% in Stade plant (Germany) thanks to the implementation of a new waste disposal system in hangars and office buildings. In addition, the use of smart chips added to the selective collection pans allows immediate access to quality, quantity and destination information about the collected waste, and helps to further improve the flow, management and costs.

Addressing local impacts

Due to the size and the complexity of the products manufactured, Airbus' activities require an atypical infrastructure. The company seeks to integrate its infrastructure within the individual local contexts, minimising the level of impact on both the human and natural environment.

Taking great care of local environmental impacts

Airbus sites pay careful attention to local environmental issues. Even before launching the ISO 14001 project, Airbus initiated a series of measures to minimise the risk or potential impact on the local environment, in order to be a responsible citizen.

The A380 programme required enhancements to existing infrastructures and the building of new ones, such as the J.L. Lagardère final assembly line in Toulouse, officially inaugurated on May 7, 2004. On each modified or new manufacturing unit, Airbus considers specific ecological aspects in order to preserve flora, fauna and habitat, in the design, building and future operating phases.

Minimising disturbance levels from flight tests

Flight tests are an essential part of aircraft certification. They guarantee that aircraft performance and systems meet or exceed the highest safety standards required by certification authorities.

Airbus flight tests are performed in Toulouse, using the runways of Toulouse Blagnac airport. They currently represent less than 8% of the total number of airport movements – a proportion that is decreasing as the level of commercial traffic continues to grow.
To reduce the environmental impact of its flight tests, Airbus has implemented a number of measures:

- Whenever possible, the noisiest flight tests are relocated to Istres, a military base in the South-East of France with no immediate neighbours. Airbus has invested in adapting the runway and the parking zone to accommodate heavier aircraft, such as the A340 and the A380.
- For the flight tests performed in Toulouse, the flight pattern height has been increased from 3,000 ft to 4,000 ft in agreement with air traffic control.
- Flight tests are never planned at night.
- No training flights are performed in Toulouse Blagnac airport.
- Test pilots are regularly given recommendations on reducing the impact of flying procedures on the neighbouring environment.
- Finally, Airbus informs local communities through the local daily newspaper when a flight test is exceptionally scheduled on a Sunday.

Airbus, as an operator at Toulouse Blagnac airport for its flight tests, participated in the development of the airport environmental charter and supports the implementation of its commitments.

Airbus green building: a new development designed for users and environment

When fully operational in 2006, the new building will welcome 1,150 employees. From this project, Airbus is moving towards a more holistic approach in its construction policy in the context of sustainable development.

Airbus is developing a new customer support building in Blagnac based on the best environmental standards in the construction industry. This environmentally focused approach has been the starting point of the whole building's conceptualisation. One of the priorities Airbus has set is to optimise the building's energy and environmental performance.
The building should achieve a yearly global energy consumption of less than 140 kWh per effective square metre through climatic use of vegetation, appropriate building orientation, maximised use of natural light, sound choice of structural materials, adaptable piloting of equipments and areas…

This represents half the regular overall energy consumption of similar existing Airbus buildings (around 300 kWh/m^2). As working conditions can substantially influence employee wellbeing, another core concern of the project team was to ensure the best workplace comfort and healthiness.

When fully operational in 2006, the new building will welcome 1,150 employees. From this project, Airbus is moving towards a more holistic approach in its construction policy in the context of sustainable development.

Key figures

Airbus flight tests currently represent

less than 8%

of the total number of Toulouse Blagnac airport movements

Green building atrium.

External view of green building.

Transportation

Close co-operation among specialised sites in France, Germany, Spain and the United Kingdom is a fundamental feature of Airbus and is a key factor in its success. Airbus has always nurtured the sharing of knowledge and best practice to optimise the cost, speed and environmental effect of our transportation activity.

Aircraft sections transportation

With an economic model based on the inter-site routing of aircraft sections, Airbus has developed an efficient transport system that minimises the impact on the environment.

The A300-600ST Beluga, a custom-built Airbus freighter aircraft, is a key element of this system. Taking advantage of the airports adjoining most Airbus facilities, the Beluga is able to directly transfer large, heavy aircraft components from manufacturing sites around Europe to the final assembly lines in Toulouse and Hamburg, in an average of just two days. Able to carry heavy cargo loads, the A300-600ST has a very low noise level, having more than 14 EPNdB margin to the current international limit. Furthermore, contrary to ground transportation systems, this (low) noise disturbance is limited to the airport neighbourhood.

Due to the size of the new A380 aircraft, a specific transportation system has been developed (see page opposite).

Unloading the Beluga

Employee travel

Airbus is also sensitive to environmental and safety issues concerning its employees. The company addresses onsite and offsite transportation issues by organising safer and more efficient shuttle bus services and circulation rules. Following extensive onsite surveys and employee consultation, travel plans have been created and publicised to minimise individual car use, promote car sharing and the use of buses and bicycles.

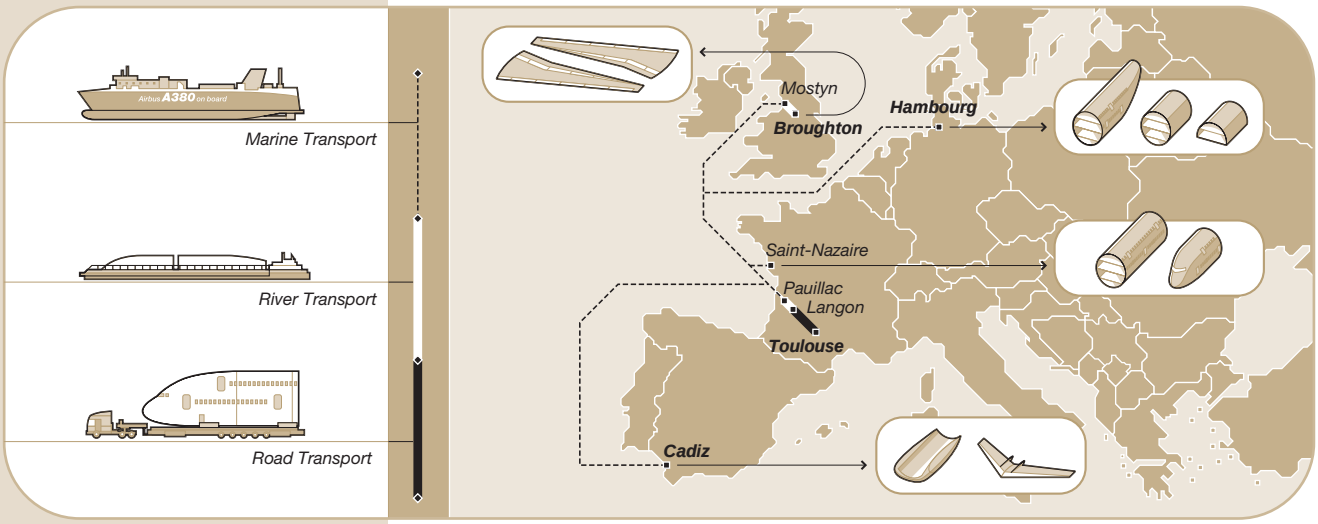
An improved, more frequent internal bus service at the Airbus Filton site in the UK has increased the number of employees travelling by bus from 1,850 to over 5,000 per week. Safety was an integral part of the travel plan, through the introduction of speed limit interactive signs, pedestrian crossings and improved pedestrian walkways. Filton was granted a Silver Award as part of the Avon Area Employers Travel Plan Award Scheme, in recognition of the site's work with local businesses and councils, and, in particular, the significant reduction of on-site traffic movement and pollution and the general positive response to the employee travel survey.

Similar initiatives were taken at the site in Toulouse, where more than 1,000 people now use the company's bus service every day.

5,000

employees per week travelling by bus at Filton site

Transportation of the A380 sections- the choice of multi-modality



With the A380, Airbus continues to rely and build on its historical production scheme, based on existing experiences and infrastructures. Thus, A380 sections are manufactured and assembled in Germany, the United Kingdom, France and Spain and then transported to Toulouse for final assembly. Yet, with sizes exceeding Beluga's capacity, Airbus has had to evaluate and choose alternative transport solutions.

The widest range of options and suggestions (including the use of gas-powered balloons) has been closely scrutinised. A multi-modal transport scheme with maritime shipment on the longest distance has emerged as the sole feasible – yet effective – technical solution.

The exceptionally large, low-speed road convoys will be organised at night on a monthly basis, gradually increasing to once a week by 2008. The lorries have been equipped with special noise reduction features as well as specific guidance systems in order to ensure a smooth path at constant speed and to avoid any incidental effects that could cause higher nuisance.

Certain road segments have had to be slightly adapted to allow the conveyance of loads that can extend to 14m high, 8m wide and 50m long. Several safety improvement and landscape measures have been taken along the way. As a user of the road, Airbus has been involved in extensive dialogues with local communities in the effort to improve the project.

Case study

The harbour of Langon

On a purely environmental basis, together with technical practicalities, it was decided that the transportation of aircraft sections from Bordeaux to Langon would be done on the River Garonne. This will ensure that the transport avoids passing through Bordeaux city by road. In order to minimise the impact of such river transportations, some specifically designed barges have been built in Holland; the double-hulled barge design has been tested in specific conditions to reduce the bow wave to its minimum and avoid any damage to the river sides. Furthermore, following meetings with fishermen, Airbus managed to develop this transport with the lowest impact on their activity. The noise of the barge's engines has been minimised to 55dB(A) at 30 metres in the case of normal thrust (corresponding to the typical noise of the fishermen's boats).

Product performance

Innovation

Airbus is renowned for being a highly innovative company, which aims to be the reference point for the rest of the industry. Environmental issues are high on the agenda for Airbus' research teams, from the very beginning of concept, product and process design.

Innovative design for the environment

To anticipate potential EHS issues resulting from projected traffic growth, research and development projects investigate, test, validate and optimise technologies, design features, configurations and architectures. Whenever possible, EHS issues are "designed out" from the very beginning by using the best options currently available and developing and implementing new concepts where appropriate.

For example, Airbus considers the entire product life cycle to ensure a comprehensive picture of potential environmental impacts, from production to end of life cycle. All potential environmental issues are considered during the design stage to ensure timely integration of the necessary technological improvements.
As part of the European research programme TANGO, a preliminary simplified Life Cycle Assessment (LCA) methodology has been applied to new and future composite technologies, enabling an objective comparison with metallic baseline solutions and the subsequent selection of the most appropriate materials, taking full account of the environmental dimension, including composite waste recycling. For instance, Airbus' site at Stade in Germany initiated a project in March 2003, in collaboration with the Technical University of Hamburg and other industrial partners, to value the Carbon-Fibre-Reinforced Plastic (CFRP) recycling.

Protecting our planet is a serious responsibility, and Airbus is aware that reducing environmental impact at the source is a key factor. Through permanent research and the implementation of appropriate innovative designs, our engineering activities are bringing direct benefits to the environmental performance of our aircraft.

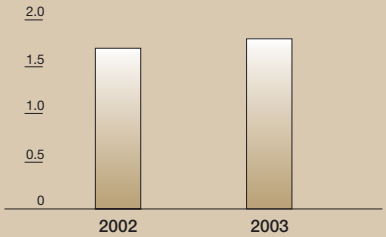
Alain Garcia,
Executive Vice-President, Engineering

ACARE environmental targets by 2020:

- Reduction of perceived noise by 50%
- Reduction of fuel consumption by 50%
- Reduction of CO_2 emissions by 50%
- Reduction of NOx emissions by 80%

These objectives are set for the standard aircraft and operating conditions expected in 2020, compared to the standard aircraft and operating conditions of 2000.

Indicators



R&D expenses in billion euros

Weight savings

Reducing the basic weight of an aircraft helps to minimise fuel consumption and, subsequently, the level of engine emissions.

Material and process innovations leading to aircraft weight reduction have recently focused on metallic and composite innovation and Airbus products already integrate a high level of composite technology.

For example, the A380 will be the first large commercial aircraft with a Carbon-Fibre-Reinforced Plastic (CFRP) composite centre wing box, representing a weight saving of up to 1.5 tonnes compared to the most advanced aluminium alloys.

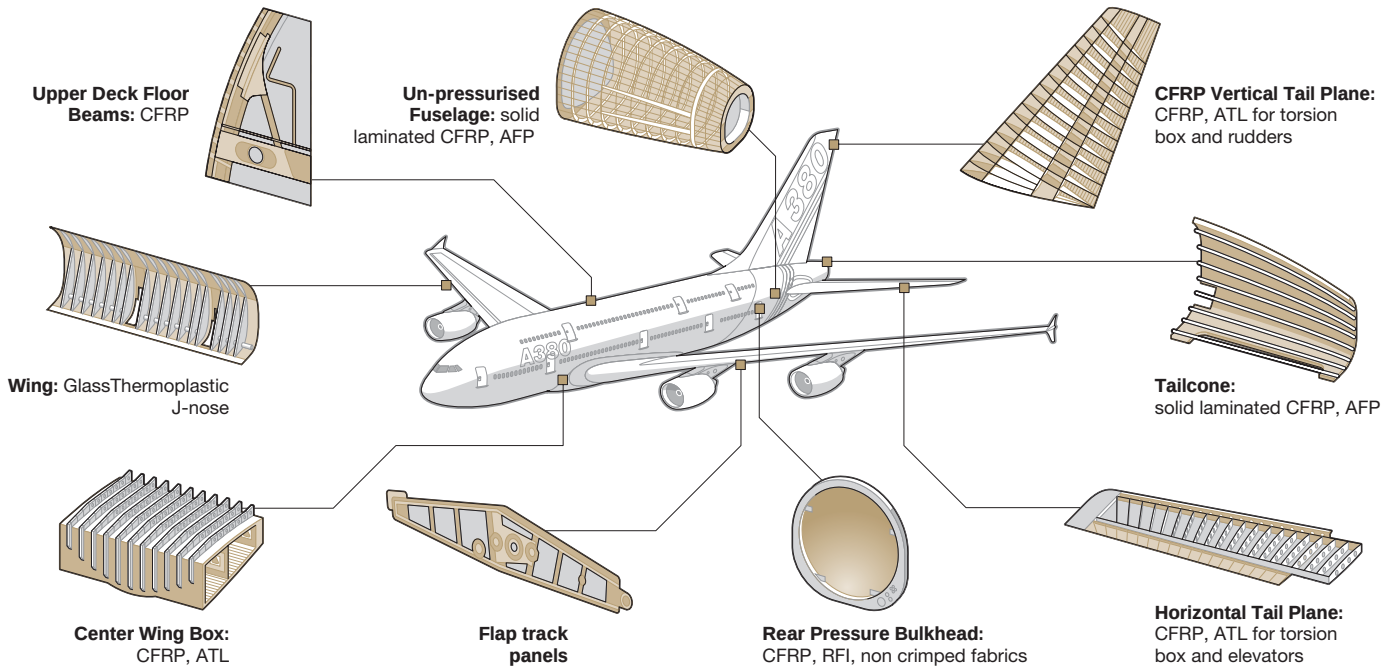
Aircraft for tomorrow

Reconciling the growing demand for air transport with related environmental issues is a critical challenge for the industry.

Airbus has captured and analysed the key driving factors for the future air transport system. The Proactive Green Plane has been envisioned on the basis of environmental performance being a top requirement.

On a larger scale, Airbus strongly supports the vision of the Advisory Council for Aeronautics Research in Europe (ACARE) related to the research challenges faced by the aeronautics industry. Airbus will actively contribute to achieving the objectives for the reduction of environmental impact.

A380-800 *Plastic (CFRP) and Thermoplastics Applications*



A330 performance: spreading eco-efficiency through market effectiveness

Over the past three decades, Airbus has developed a family of aircraft that makes not just good business sense but also good environmental sense. The A330 is a perfect illustration of Airbus' ability to both design and manufacture environmentally and cost-efficient aircraft.

Widely adopted by the airline market, the A330 Family comprises two mid-size, medium to extended range aircraft. The research for the A330 especially targeted aerodynamics and diffusion of composite materials in the aircraft structure. It allowed considerably reduced weight (thus fuel consumption) and optimised flight performance. As a result, the A330 introduces the best ever environmental standards together with outstanding economics.

A330 Family

SPAN	60.30 m
LENGTH	58.80-63.70 m
HEIGHT	16.80-17.40 m
MTOW	230-233 t
CAPACITY	253-440 seats
RANGE	5600-6650 nautical miles
NOISE	Up to 20dB margin versus Chapter 3
FUEL BURN	3.4 litres / passenger / 100 km*

* with a 70% load factor (typical for international flights).

IN THE AIR

Low fuel burn – reduced impact on the atmosphere

The A330 burns **as little as 3.4 litres of fuel*** to carry one passenger over 100 km, thus minimising its carbon dioxide (CO_2) emissions having an impact on climate change.

* Typical 70% load factor.

Low emission

The A330 is very respectful of the air quality around the airports. The levels of unburned hydrocarbons (HC) and carbon monoxide (CO) emitted by an A330 during a complete landing and take off (LTO) cycle, although engine dependent, can be as low as 10% and 20%, respectively, of the authorised levels by ICAO.

Nitrogen oxides (NO_x) have comfortable margin with current regulation and will be fully compliant with the 12% additional reduction when applicable in 2008.

ON BOARD

For crew

The A330 shares with other Airbus fly-by-wire aircraft the unique advantage of flight operational commonality (virtually identical cockpits, handling characteristics and procedures), allowing crew to alternatively fly shorthaul flights (on A320 Family aircraft) and medium- to longhaul flights on A330-A340. The use of fly-by-wire technology reduces aircraft weight and improves flying conditions, thus reducing fuel burn and CO_2 emissions.

For passengers

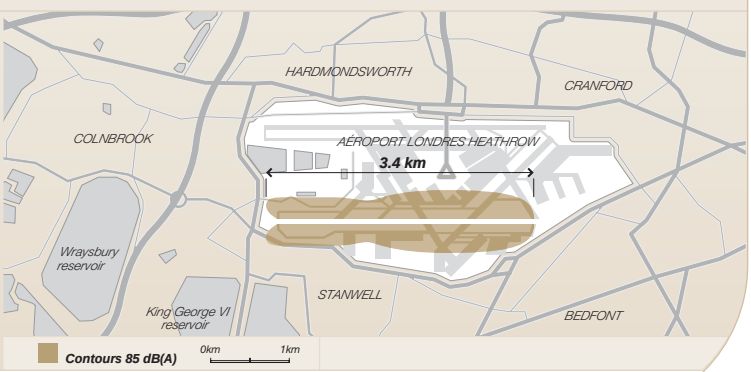
The cabin of the A330 shares a similar base with the A340. It is the quietest in the skies; noise on board is as low as the level of a typical conversation (about 60 dB). State-of-the-art air distribution and superior interior features deliver excellent standards of comfort.

ON GROUND

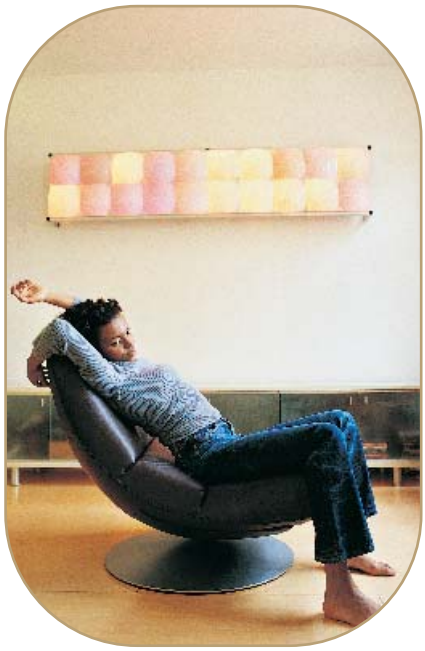
Low noise – a good neighbour

The A330 goes far beyond regulatory requirements (up to 20 EPNdB margin to Chapter 3 standard for the highest weight variant), making it compatible with future envisaged regulations.

This results in good integration into the existing infrastructure, with limited impact on the environment. For instance, at London Heathrow airport, the noise footprint at 85dB(A) for an A330 taking off is strictly located inside the airport boundaries.



A330 : the optimised mid-size aircraft

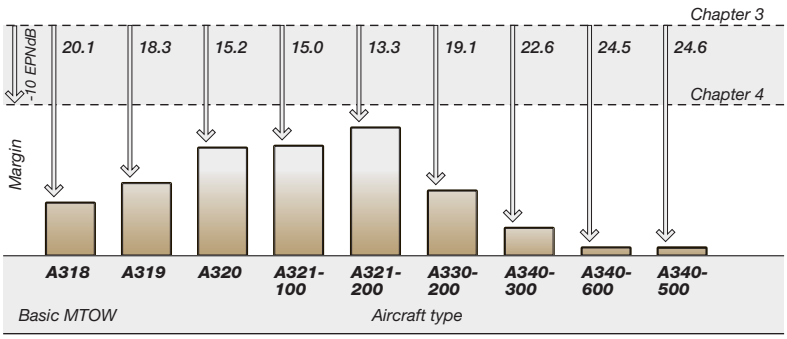


Noise

Despite the tremendous improvements already achieved, aircraft noise remains a key concern for people living near airports. Airbus remains committed to addressing noise issues through continuous innovation and co-operation with other stakeholders, such as engine manufacturers.

Noise certification procedure

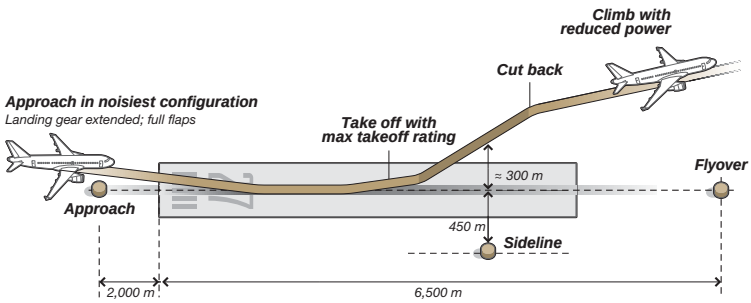
Aircraft built today must meet the noise certification standards adopted by ICAO annex 16.
The initial standards for jet-powered aircraft designed before 1977 were included in Chapter 2 of Annex 16. The ICAO then strengthened these requirements in Chapter 3 and subsequently adopted Chapter 4, which will take effect from January 1st, 2006. Thanks to advanced acoustic technology, the noise levels of all Airbus aircraft are lower than Chapter 3 limits (with a comfortable margin for the most modern ones), already anticipating Chapter 4 limits.



Cumulative noise margin (EPNdB) – Airbus' fly-by-wire Family

The Balanced Approach

In 2001, the ICAO assembly endorsed the concept of a "Balanced Approach" to aircraft noise management (Appendix C of assembly Resolution A33-7). This involves analysing the various noise reduction measures through the exploration of four principal elements, namely: reduction at source (quieter aircraft), land-use planning and management, noise abatement operational procedures and operating restrictions. A guidance document was developed by ICAO technical working groups, and the latest CAEP, in January 2004, recommended that the ICAO assembly validates this document. Airbus strongly supports the balanced approach and is committed to working closely with airlines and airports to limit the number of people exposed to disturbance from aircraft noise.



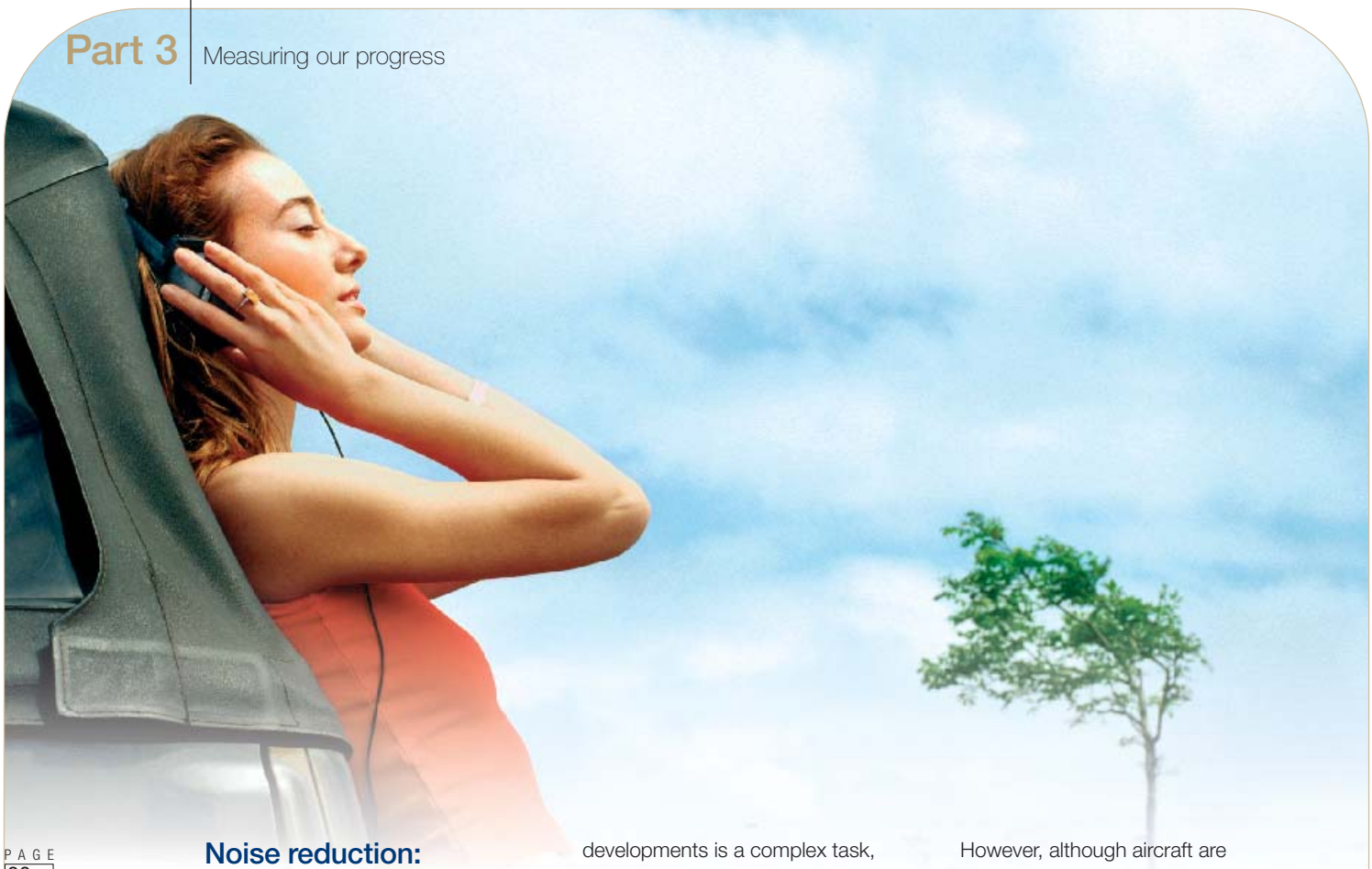
To achieve certification, an aircraft must demonstrate that the noise levels measured at three certification points do not exceed the limits defined by ICAO Annex 16.

These points are:

- flyover, at 6.5 km from brake release point, under the take off flight path;
- highest measurement recorded at the sideline, 450 m from the runway axis, during take off;
- approach, at 2 km from the runway threshold, under the approach flight path.

Cumulative levels are defined as the sum of the three certification levels.

ICAO Annex 16 certification procedure



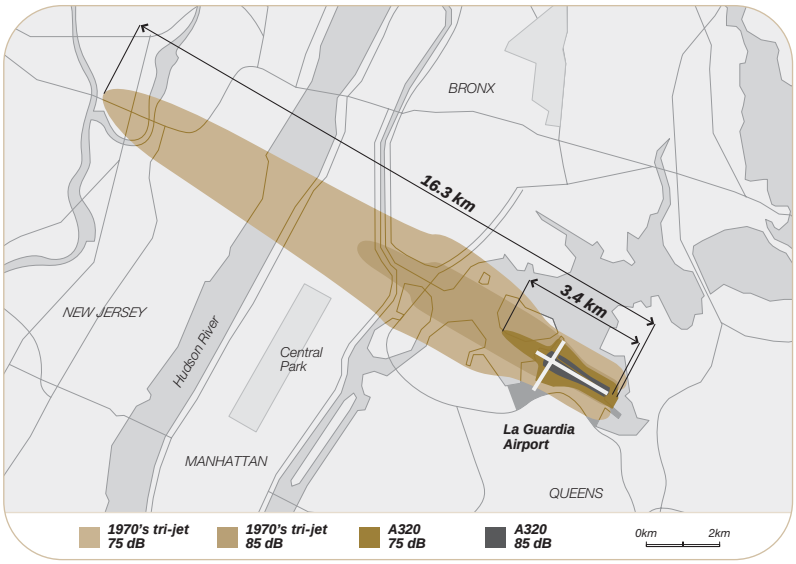
Noise reduction: achievements and future targets

As a manufacturer, Airbus' first priority is reduction at source. Major improvements have already been achieved.

- Aircraft entering today's fleets are typically 20 decibels quieter than comparable aircraft thirty years ago. In practice, this corresponds to a reduction in noise annoyance of about 75%.
- At a distance of 700 metres, the noise of an A320 taking off is around 70 decibels, which is much lower than a high-speed train passing at 100 metres (92 decibels) or an ordinary bus passing on the other side of the street (82 decibels).
- The "noise footprint" (area of noise greater than a given level — for instance 80 decibels — drawn on the ground for an aircraft landing or taking off) has also been dramatically reduced. For instance, the footprint of an Airbus A320 is less than one tenth of the area of the footprint created by a similar sized 1970s tri-jet.

Airbus is continuously seeking further noise reductions at source by researching and developing new technology through the use of increasingly sophisticated methodologies, including computational methods and new measurement techniques. Implementing these developments is a complex task, which can itself be subject to intensive R&D efforts, in order to establish the optimum balance between noise, fuel efficiency, emissions and other design criteria, while always preserving the highest safety margins. Operational noise abatement procedures offer significant potential for improvement and advanced aircraft systems enabling these procedures to be further developed is an area of intensive research. For instance, in addition to its impressive noise performance, the A380 will feature a programmable automatic noise-over-ground optimisation tool for minimised noise exposure under the flight path.

However, although aircraft are becoming less noisy, the residential areas around airports are experiencing a growth trend, and efforts towards noise reduction at source are only of benefit if they are applied alongside proper land-use planning and management around airports. Airbus has no direct responsibility in this field, but is committed to providing airports and airlines with the best technological and planning information it has available, such as contributing to the future traffic forecasting, to help establish appropriate airport noise zoning and planning.



Case studies

■ Airbus is part of the largest ever aircraft noise research programme. Known as SILENCE(R), it brings together 51 organisations from across Europe. Since 2001, the team has been working towards the validation of aircraft noise reduction technologies to achieve quieter aircraft, up to 6 decibels, by 2008. The latest development, in January 2004, was the delivery of the world's first full-scale zero splice nacelle intake – a newly patented concept for engine fan noise reduction. The zero splice was developed by Airbus' design office in Toulouse and manufactured in Nantes. Following performance testing it will be put into production on the A380 in 2006. The technology has been designed to achieve acoustic advantages without weight, cost or fuel consumption drawbacks. A range of technologies, developed by participating organisations, is being tested to enable full-scale validation prior to application on existing and future aircraft products.

■ About 10 years ago, Airbus started developing software called NLC (Noise Level Computation), which calculates the noise level produced by its aircraft during a single-event take off, climb, approach and landing phase. When combined with other software package that compute the aircraft's flight path in different operating conditions, this tool can determine the noise level recorded on the ground for any chosen point on the flight path. Therefore, in a set of computed take off or landing trajectories, it can select the best option in terms of noise mitigation. The software can also draw footprints at fixed noise levels around a specific airport. Airbus makes this package available to any airline operating its aircraft and provides specific training through its customer support specialists.

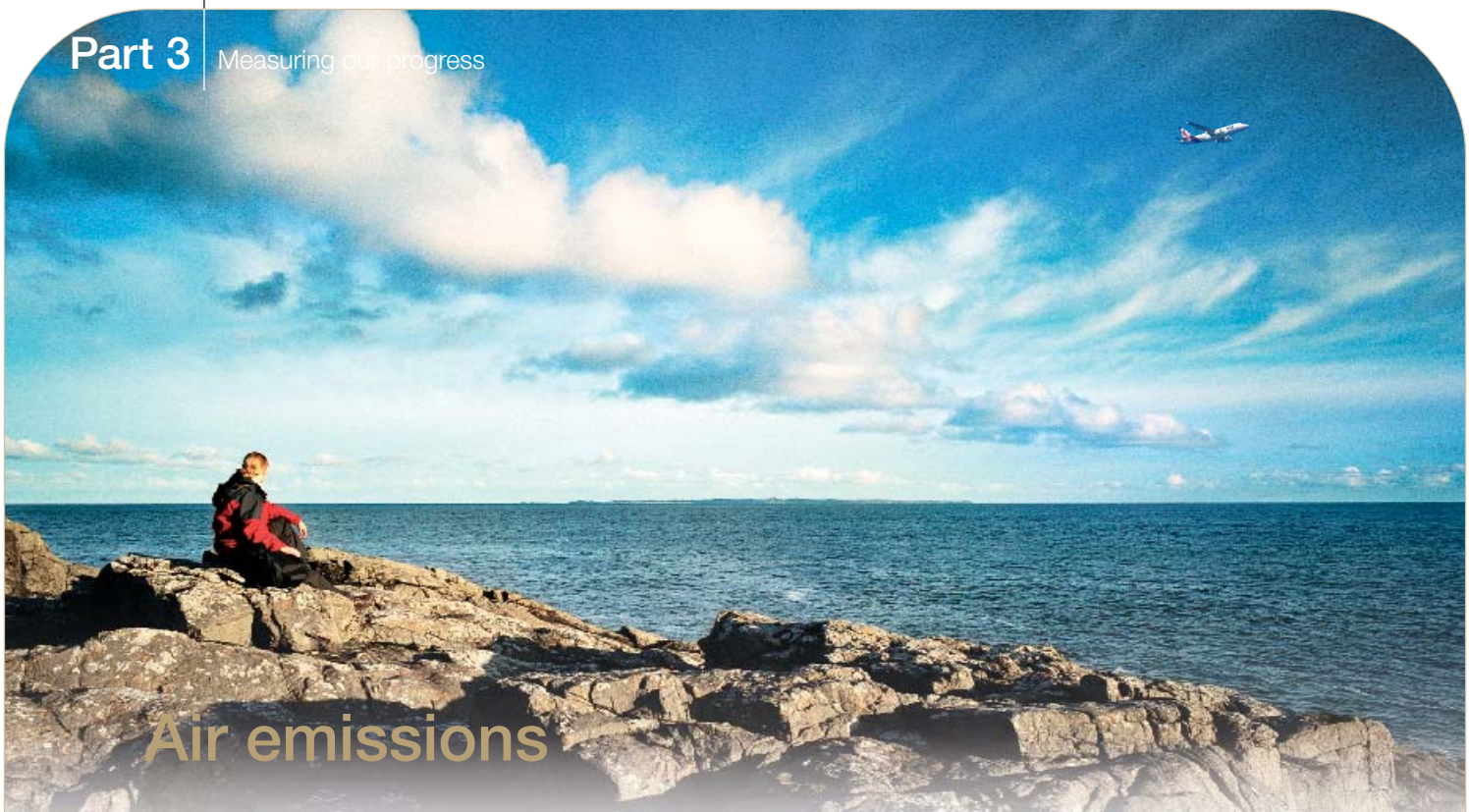
Targets

To reduce perceived noise by

50%

by 2020 (ACARE target).
This corresponds to a reduction of about 10db at take off and landing.

Sound investment – the first zero splice nacelle intake is unveiled at Nantes site (France).



Air emissions

Careful control of both air quality and global atmospheric conditions, together with a thorough understanding of the consequences of today's actions on the planet's future, are everyone's concern. Aircraft emissions can affect air quality around airports and currently contribute to about 3.5% of man-made CO_2 emissions. Airbus is committed to addressing environmental issues related to aircraft emissions, while also meeting society's growing demand for air transport.

Certification procedures

Emissions of nitrogen oxides (NOx), unburned hydrocarbons (HC) and carbon monoxide (CO) are subject to stringent international standards that are regularly upgraded by the ICAO. To achieve certification and to be licensed to operate, aircraft engines must meet the criteria defined in Annex 16 to the Chicago Convention. The certification test cycle analyses the level of emissions at four different operating regimes, corresponding to Landing and Take off conditions (LTO cycle).

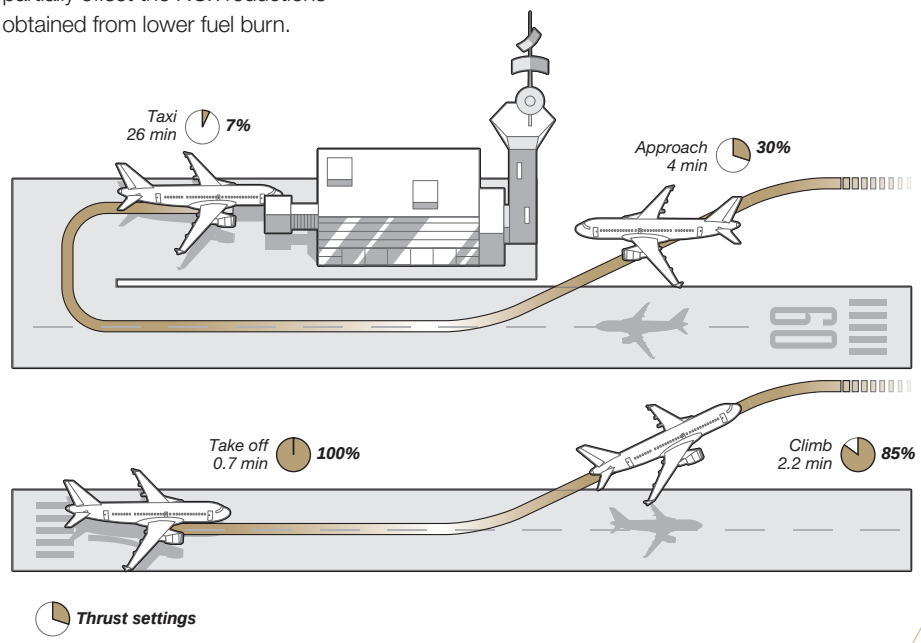
Local air quality

Higher engine bypass ratios and combustion temperatures reduce fuel burn and improve combustion efficiency. HC, CO and smoke emissions could though be reduced by more than 90% since the 1960s (see page opposite). However, higher combustion temperatures increase relative NOx emissions due to a secondary reaction between the oxygen and nitrogen in the air, which would partially offset the NOx reductions obtained from lower fuel burn.

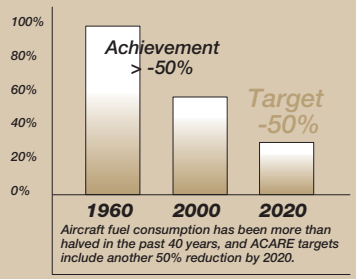
The NOx optimisation of combustion allowed nevertheless for continued improvements and are reflected in the allowed NOx emission levels reduced by 36% since 1981. A further reduction has been adopted by CAEP and is due to be applied on new engines from 2008 onwards. In order to continue the NOx reduction trend, new combustion concepts, more complex and expensive, will be developed, built on the results of ambitious research programmes currently in progress.

The certification process is performed on a test bed, where the engine is run at four different thrust settings, namely:

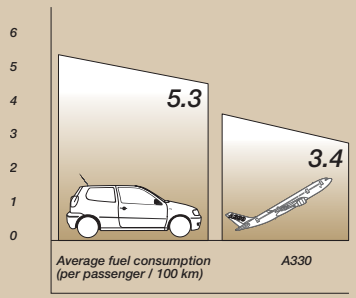
- take off (100% available thrust) for 0.7 min
- climb (85% available thrust) for 2.2 min
- approach (30% available thrust) for 4.0 min
- taxi (7% available thrust) for 26 min

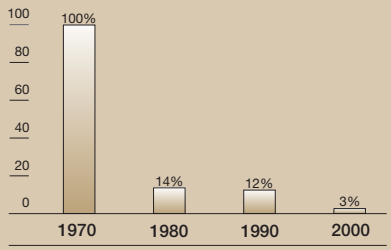


Indicators



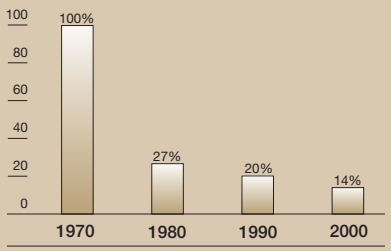
Aircraft fuel consumption has been more than halved in the past 40 years, and ACARE targets include another 50% reduction by 2020.





Based on standard ICAO LTO cycle.

HC emissions



Based on standard ICAO LTO cycle.

CO emissions

Fuel efficiency

Fuel consumption is one of the airlines' main operating costs and increased fuel efficiency remains a key priority for the entire industry. As most aircraft emissions are directly related to fuel consumption, engine and airframe specialists in the industry have sought and achieved dramatic improvements in the past decades by increasing fuel efficiency.
This efficiency has to remain at the forefront of operators' expectations throughout the whole life cycle of the aircraft. The fuel efficiency of an aircraft is obviously one of the most important criteria in the airlines' choice and it is a high focus when designing an aircraft. In addition to weight savings, reductions in drag and improvements to engine technology also contribute to a lower fuel burn per seat. Once the aircraft is delivered, it is essential to make sure that this efficiency remains close to its specification. On this point, Airbus offers performance monitoring techniques and documentation and helps airlines in identifying maintenance actions to keep the aircraft performance at optimum level.

Climate change

According to the Intergovernmental Panel on Climate Change's special report on aviation and the global atmosphere in 1999, aviation's share in climate change stands at around 3.5% of total contribution from human activities. This share can be expected to grow to 5% by 2050 due to the increasing demand for air transport.

CO_2 and water vapour emissions from aviation directly contribute to the greenhouse gas effect, whereas NOx contributes indirectly through the creation of ozone. According to publications from the European Commission, the overall effect of NOx and contrails was overestimated in the 1999 IPCC special report. However, there remains considerable uncertainty concerning the impact of specific emissions such as NOx, contrails and the indirect effects of aviation on cirrus clouds.
As alternative aircraft fuels are unlikely to emerge in the coming years, the best way to limit aircraft GHG emissions remains optimising fuel consumption.
To help achieve this, Airbus seeks to maximise the benefits offered by lighter materials, aerodynamics and in-flight optimisation. High capacity aircraft such as the A380 also respond to environmental issues by carrying more passengers and freight, while consuming less fuel.
Looking even further ahead, Airbus will continue to actively support the improvement actions identified by air transport industry (CAEP and ICAO):

- looking for technological solutions (e.g. hydrogen for Auxiliary Power Units - APU);
- improving air traffic control (latest advances such as FANS, Future Air Navigation System);
- shortening aircraft routings (polar routing, Long-Range Operations - LROPS).

The latest CAEP conclusions on NOx emissions

ICAO Committee on Aviation Environmental Protection (CAEP) recommended a new stringency increase for NOx emissions from aircraft engines. This new authorised level would be applicable to new engines being certified after 2008 and would be 12% lower than the existing standard. The committee also agreed to review the NOx limits in 2010, depending on the outcome of current research programmes and the application of new and future technologies. The ICAO Council and Assembly are likely to endorse the CAEP recommendations in October 2004.

Meeting **society's** expectations

Airbus understands that today's society expects more from companies than just financial performance. Indeed, a key element of the company's success has been its ability to listen, respect, and respond to stakeholders' environmental concerns and expectations. As an aircraft manufacturer, Airbus' first duty is to design and build safe aircraft that meet the needs of airlines and their passengers. And, as a global citizen with local responsibilities, Airbus also has a duty towards numerous communities around the world.

Cabin comfort

The reassurance that they are travelling in a safe, healthy and comfortable environment is a basic requirement of passengers and crewmembers. For more than thirty years, Airbus has fully co-operated with airlines to design cabins that meet passengers' expectations, while constantly improving crews' working conditions.

Air quality

Several elements can affect passenger and crew perception of air quality in the cabin:

- thermal comfort (temperature, humidity, air velocity);
- cabin pressure;
- presence of air contaminants (dust, bacteria, VOCs, CO_2, CO…).

Thermal comfort

The flow pattern in the cabin is a key factor in achieving a high level of thermal comfort. Airbus designs its ventilation systems to ensure equal air distribution throughout the cabin, with the allocation and design of outlets optimising air distribution in each zone.

The recirculated portion of cabin air (around 40% in normal flight operation conditions) allows air in the cabin to be exchanged around 20 times per hour. The nominal flow of oxygen on all Airbus aircraft is more than 80 times higher than the basic requirements of a seated person (6 to 8 litres per minute).

A low humidity level is also often perceived as a concern during long-range flights. Because of the altitude, the air entering the cabin from outside the aircraft is extremely dry. However, although low levels of outside air flow are necessary to achieve a humidity level usually perceived as comfortable (i.e. causing no dry eyes, nose and throat), these outside air flows are also required to dilute contamination in the cabin. To fully address both these issues, Airbus is investigating solutions to improve thermal comfort by active humidification.

Temperature preferences vary a lot according to individual and cultural aspects. For example, Americans tend to prefer travelling at lower temperatures than Europeans. Airbus aircraft enable a high degree of flexibility for temperature selection, while ensuring a constant temperature distribution throughout air recirculation systems.

Cabin pressure

Atmospheric pressure becomes lower with any increase in altitude. As aircraft are typically cruising at an altitude of around 11 km (36,000 ft), the pressure is about four to five times lower than on the ground. Pressurisation of the aircraft fuselage is therefore necessary to maintain acceptable conditions. This creates a pressure difference between outside and inside the aircraft, leading to associated structural requirements, which in turn, increase the weight of the aircraft.

> Airbus cabins are not only innovative and attractive, but are also being continuously improved and redesigned to keep offering travellers the quietest, most comfortable and enjoyable journeys.

John Leahy,
Executive Vice-President,
Customer Affairs, Chief Commercial Officer

Health requirements are a prerequisite in establishing the required level of pressurisation and, once they are defined, an optimum has to be found between higher levels of comfort (with a higher pressure to be closer to sea level) and the weight of the aircraft structure (and consequent fuel consumption). The level of cabin pressure has also a direct influence on the oxygen saturation of the occupants' blood. The actual certification requirement is to keep the "cabin altitude" lower than or equal to 8,000 ft. Airbus' cabin altitude averages between 5,500 and 6,500 ft and the maximum cabin altitude for the Airbus long-range aircraft, the A330/A340 Family and A380 Family, is set for 7,350 ft for longer flights to provide an additional margin of comfort.

Air contaminants

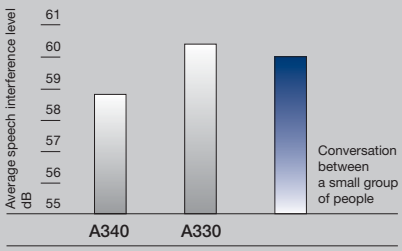
Several internal and independent measurement studies over the past ten years have identified several key issues concerning air contaminants in aircraft cabins:

- **Microbiological contamination:** very low concentrations of mainly non-pathogenic bacteria and fungi were detected during studies. The filtration level in an aircraft is similar to that used in hospitals. In the event of a bacteria peak, after a sneeze or cough, an efficient ventilation system quickly reduces the bacteria levels.
- **Dust:** where high efficiency particulate filters are installed, recirculated cabin air is up to 250 (during cruise) to 2,800 (during taxi) times less contaminated with dust particles than the external air flow.
- **Volatile Organic Compounds:** all the VOCs found in cabin air are also present in the "normal" indoor air of homes. Most are close to the limits of detection and never above standard requirements, and thus present no unusual exposure situation.

Noise and vibration

Thanks to continuous innovation, there has been significant progress in minimising the level of noise and vibration in the cabin, and Airbus uses a variety of interior aircraft design options to achieve this, such as duct silencers, advanced insulation materials and the elastic mounting of panels. With one of the quietest cabins in the sky, the A340 illustrates Airbus' concern for passenger comfort. For example, at cruise conditions, the speech interference level of noise can be as low as 59 decibels, which is about the noise level of a normal conversation.

Indicators



Interior sound level in cruise

R&D projects related to cabin comfort

Cabin innovations have been at the centre of Airbus' commercial success. Airbus continues at the forefront with its involvement in a range of European research and development projects related to:

- cabin air quality and required standards (under guidance of AECMA today ASD);
- filtration and air distribution;
- humidity, thermal comfort, and air purity in cabin and crew work and rest areas.

Additionally, Airbus Deutschland has used nationally funded projects to build a unique test facility simulating a cold exterior fuselage on the scale of an A380 mock up and develop breakthrough technologies for cooling systems, insulation technology and individual thermal comfort.

Local development

Economic growth is necessary to improve welfare standards in society and to help alleviate poverty, which is itself a key factor in environmental degradation. Instrumental to social and economic exchanges, air transport is a critical element of global and local development.

Investing in communities

Airbus has a major social and economic influence in the numerous locations where it operates and, therefore, has special responsibilities towards these local communities. Airbus takes this role very seriously by supporting the creation of local jobs and participating in local economic development projects.
The A380 programme alone is creating numerous long-term jobs, bolstering both Airbus' and sub-contractors' workforces around the world. Overall, the A380 programme will generate more than 200,000 direct and indirect jobs all over the world. For instance, about 10,000 jobs will be generated in the South-West of France.

Airbus has been involved in several initiatives to foster the creation of new businesses and increase co-operation with local partners. Founded in 2001, Airbus Development shares Airbus' resources and expertise with other local firms to help create, export and develop their activities. In 2002 and 2003, Airbus Development helped around 30 firms belonging to the aerospace industry sector or to other domains hiring employees who lost their job because of the downturn in the chemical industry sector after the AZF chemical explosion at Toulouse in September 2001.

Working and retired Airbus managers also use their skills to support Airbus Insertion's scheme, which helps to provide suitable social and professional placements for individuals seeking commercial experience.

For example, Airbus Insertion and its local partners have established L'Envoi, specifically aimed at helping young people looking for a job.
In the past four years, 70% of the 250 young people involved have found work or have benefited from training.

Expanding Airbus' international role

In Russia, Airbus established ECAR, a joint-venture engineering centre in Moscow, with the Kaskol Group.
The ECAR facility promotes the cross-transfer of expertise, as well as coordinating and enlarging the scope of activities that Airbus is developing with Russian aerospace companies. The centre employed 25 engineers when it opened in June 2003, a figure that had reached 100 by the end of the year. These engineers contribute to the structural component design and stress analysis on Airbus programmes, including the A380.
In China, Airbus subcontracted the building of the "Ville de Bordeaux", a roll-on, and roll-off vessel tailor made for the transportation of A380 sections to the Jinling Shipyard, based in Nanjing. The level of involvement of Chinese suppliers and authorities in this project has opened a new chapter in the co-operation between Airbus and China.

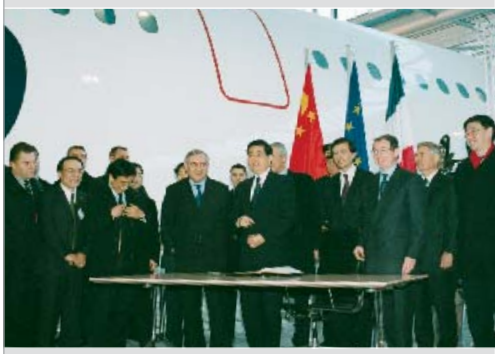
Air transport in China, an area of social and economic development

With annual GDP growth rising to more than 6% over the past two decades, and a projected higher growth rate in the coming years, as well as a large population base, China is one of the fastest growing economies and one of the largest trading powers in the world. A core support of economic activity, air traffic has grown steadily. In 2003, China's total air passengers grew to 87 million, 41 times the value for 1978.

Air travel has not only brought more tourists, it has also enabled people in the vast landlocked regions in West China to become closer to those in the central and eastern parts of the country. For instance, the town of Lijiang, in south west Yunnan Province, was one of the poorest areas in China due to its bottleneck in the transport network. Only one year after a new airport became operational, in 1995, the town received 900,000 tourists bringing 182 million yuan in revenue, equivalent to the previous three years' total.
The numerous advantages of civil aviation actually stimulate China's socio-economic development:

Airbus training centre in Beijing (China)

- Long distances and the natural barriers make interurban roads and railways, especially in the remote areas, costly to construct in China. With few fixed assets, air transport can quickly adapt to the size and content of demand by increasing flight services or opening new routes. This avoids prematurely built or overbuilt infrastructures.
- Connection to airways is key to attract investment in low-income regions. Especially important to technology-based sectors, it thus contributes to industrial diversification.
- Air transport avoids fragmenting fragile natural habitats and occupying the land needed to produce the food supply for present and future generations.



Visit of Chinese President, Mr Hu Jintao in Airbus Toulouse

Airbus in China

By the end of 2003, airlines in the Chinese mainland, Hong-Kong and Macao had a total of 220 Airbus aircraft, accounting for 30% of market share. Far beyond fleet composition, Airbus' presence in China is one of longterm investment and tied technological co-operation. Airbus has intensified co-operation with its Chinese partners and plans to considerably increase its procurement value from the current level of more than $US 10 million to $US 60 million annually by 2007. Over a quarter of the Airbus worldwide fleet has components produced in China. Airbus has also invested $ 80 million in establishing in Beijing a worldclass training and support centre, a joint-venture with China Aviation Supplies Import and Export Corporation.

Christening ceremony of a Roll-on and Roll-off vessel in Nanjing (East China's Jiangsu province)

Data tables

Airbus indicators table - Environment

GRI Index	Environmental indicators	Unit	2001	2002	2003	2003 breakdown per country			
						UK	GE	SP	FR
EN3	Total energy consumption	MWh MWh/seat	1 432 594(1) 24.37	1 415 753(1) 25.43	1 616 589(1) 28.34	337 646 5.92	551 676 9.67	97 469(1) 1.71	629 798 11.04
	Electricity consumption	MWh MWh/seat	572 809 9.75	584 061 10.49	640 940 11.24	117 603 2.06	231 179 4.05	55 598 0.97	236 559 4.15
	Gas consumption	MWh MWh/seat	823 439 14.01	802 632 14.42	940 043 16.48	213 134 3.74	317 586 5.57	29 029 0.51	380 295 6.67
	Fuel oil consumption	MWh MWh/seat	36 338 0.62	29 052 0.52	35 598 0.62	6 909 0.12	2 911 0.05	12 834 0.23	12 944 0.23
EN4	Total annual water consumption	m^3 m^3/seat	1 702 927 28.97	1 689 776 30.36	1 772 284 31.07	258 828 4.54	573 434 10.05	179 679 3.15	760 343 13.33
EN12	Total annual water discharge	m^3 m^3/seat	587 591 10.00	575 272 10.33	533 314 9.35	72 324 1.27	178 907 3.14	179 679 3.15	102 404 1.80
EN11	Total amount of waste	tonne kg/seat	63 700 1 084	57 108 1 026	61 219 1 073	9 007 158	20 922 367	1 920 34	29 370 515
	Total amount of hazardous waste produced	tonne kg/seat	27 864 474	25 877 465	26 863 471	2 671 47	7 969 140	393 7	15 830 278
	Total amount of non-hazardous waste produced	tonne kg/seat	35 836 610	31 227 561	34 355 602	6 336 111	12 953 227	1 527 27	13 540 237
	Total amount of recyclable waste	tonne tonne/seat	40 918 0.70	38 295 0.69	37 239 0.65	6 772 0.12	15 518 0.27	299 0.01	14 650 0.26
EN8	Total direct CO_2 emissions from fossil fuel combustion	tonne tonne/seat	176 281 3.00	170 055 3.05	199 606 3.50	44 933 0.79	64 899 1.14	9 429 0.17	80 345 1.41
EN10	Total VOC emissions	tonne kg/seat	2 226 38.00	2 039 37.00	2 170 38.00	196 3.43	1 135 19.90	60 1.00	779 13.66
	NO_x emissions	tonne kg/seat	222 3.78	212 3.80	249 4.37	61 1.07	87 1.52	16 0.28	85 1.50
	SO_x emissions	tonne kg/seat	127 2.16	102 1.84	126 2.20	24 0.43	11 0.19	45 0.79	46 0.80

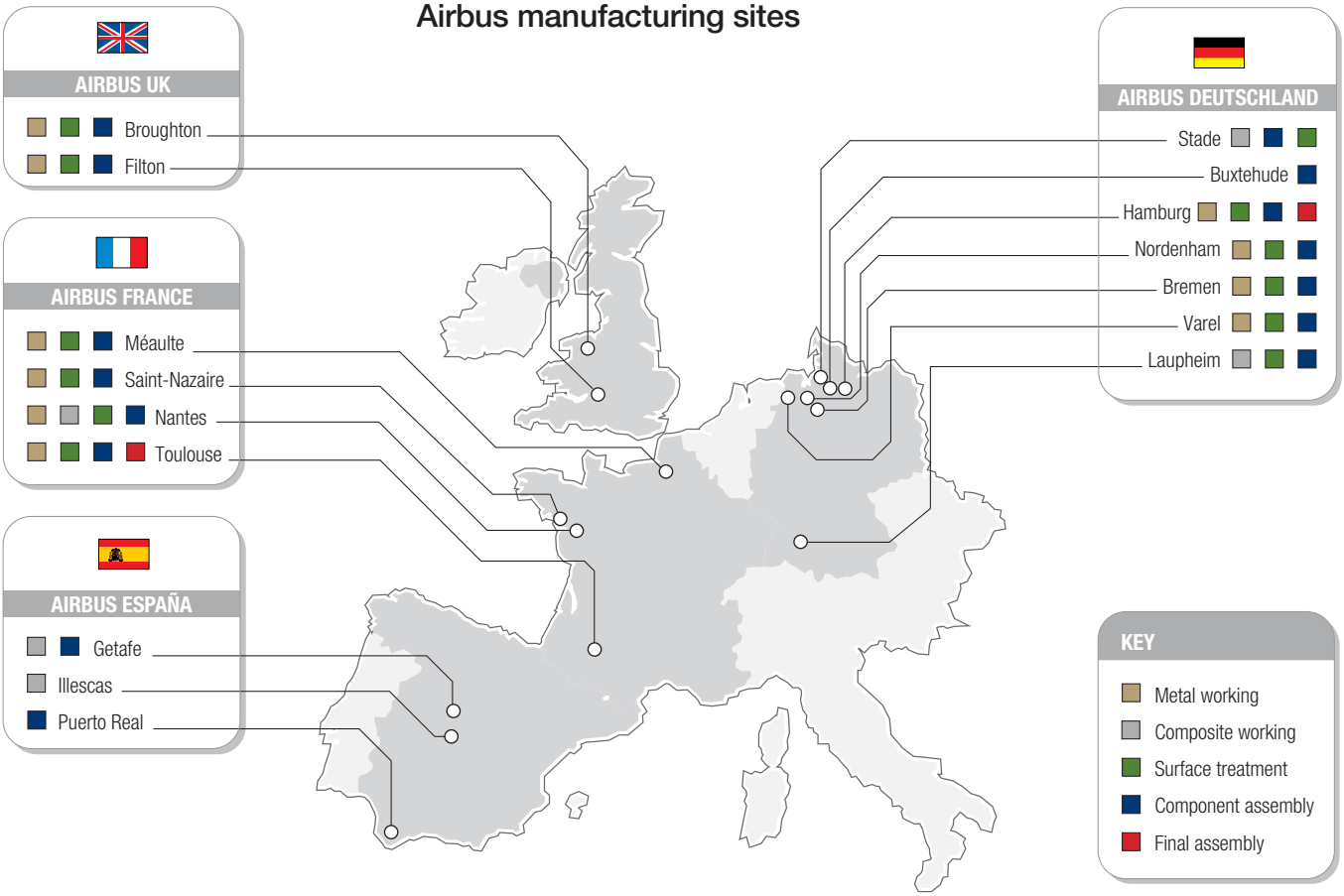
▲ Normalisation of indicators per unit of production (total number of seats produced) was determined as being the most meaningful and relevant method of normalisation.
The number of produced seats taken into account for normalisation depends on the number of delivered aircraft over the reporting period. The manufacturing and assembly of the A380, started in 2002, have increased our infrastructure perimiter (and the associated global values of most of our indicators) and since no A380 aircraft have been delivered yet, no produced seats have been taken into account for A380 activities, increasing the normalised values of our indicators despite the implementation of our continuous improvement processes.
(1): including the solar energy quantities produced in Spain.

Airbus indicators table - Social and Health and Safety

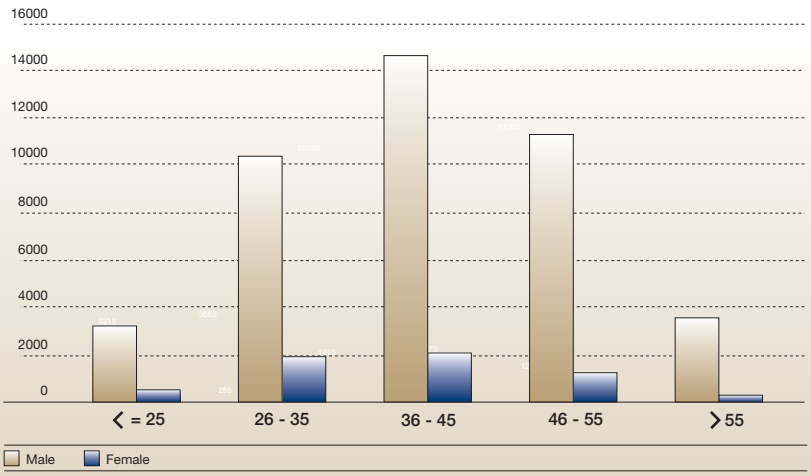
GRI Index	Health and Safety indicators	Unit	2002	2003	2003 breakdown per country				
					UK	GE	SP	FR	Central entity
LA7	Number of reportable accidents (1) Including fatal accidents	number number	799 2	752 0	100 0	247 0	105 0	282 0	18 0
	Number of days lost for accidents > 3 days	number	11 953	12 739	1 272	3 752	1 784	5 774	157
LA9	Number of Health and Safety training hours	hours	57 404 (2)	110 313	26 507	26 008	18 854	37 500	1 444
LA1	Total number of employees	number	46 300	49 195	8 688	18 423	2 726	15 536	3 822
	Breakdown per gender: Men Women	 number number		 43 171 6 024	 8 015 673	 16 233 2 190	 2 473 253	 13 620 1 916	 2 830 992
	Breakdown per status: Blue collar workers Administrative & management	 number number		 16 411 32 784					
	Average age of employees	years		40.6	41.2	40.9	41.7	39.3	42.4
	Average length of service	years		14.1	11.8	13.7	20.0	14.9	13.7
LA2	External hiring Including graduates	number number		4 569 2 283	778 328	1 588 720	425 109	1 428 794	350 332

(1): Definitions differs among countries. All countries but Spain report work related accidents with more than 3 lost working days.
Spain reports work related accidents with more than 1 lost working days.
(2): Germany's data not included.

Airbus manufacturing sites



Breakdown of employee population by age and gender



Reporting scope and methodology

Airbus published its first Environmental, Health and Safety (EHS) report in 2001. A corporate EHS report is issued every two years. From 2005 onwards, EHS data will be also published on the Airbus website (www.airbus.com) and updated on a yearly basis. This second corporate report is intended to give a transparent and balanced view of our EHS performance over the year 2003.

Reporting scope

The data published in this report covers the activities of our 16 manufacturing sites all over Europe (in France, Germany, Spain and the United Kingdom). Head offices, spares centres, training centres and other overseas facilities (customer services representatives) are not included in the present environmental reporting scope.

Reporting principles and methodology

Since its incorporation as a single unified company in July 2001, Airbus has determined a set of key environmental indicators and specified common definitions and reporting rules to ensure reliability and comparability between manufacturing sites. Indicators were selected in order to reflect Airbus' key environmental, Health and Safety impacts. Normalisation of indicators per unit of production (total number of seats produced) was determined as being the most meaningful and relevant method of normalisation.
To ensure reliability of its environmental reporting process, Airbus has prepared specific reporting procedures outlined in two main documents:

- AP2194, which describes the reporting principles;
- AM2353, which defines Airbus' key environmental indicators and specifies guidelines for the calculation of these indicators.

These documents were established in accordance with applicable international standards (GRI[1], IPCC[2], IEA[3]). They are accessible on Airbus' employee portal.

Limitations

Concerning direct greenhouse gases (GHG) emissions, only combustion of natural gas and heating fuel is reported. GHG emissions due to inter-site transportation of aircraft elements (mainly kerosene for Beluga and gas oil for vehicles) are not included. Neither are GHG gases from cooling systems (cryogenic gases).

Organisation for data collection and consolidation

Environmental co-ordinators are in charge of the reporting process at the plant level (sites) and at the national companies level (country level). Indicators are collected by the 16 sites, and then transmitted to the four national companies (NatCos) where they are controlled and consolidated. Airbus' Corporate Environmental Affairs then consolidates the indicators at the Group level and performs further consistency checks (control of calculations, uniformity of the units, consistency of conversion factors). Airbus is considering setting up a computerised reporting system, fully compatible with its existing SAP systems for the next reporting period. This will permit further improvements in the reliability of the reporting process.

Verification

Airbus is fully committed to providing reliable information on its environmental, Health and Safety performance. The Group has asked Ernst & Young to review the reporting procedures for the environmental indicators published in this report. The nature of the work performed and the results of the verification are presented on page 49 of the report.

(1). Global Reporting Initiative (www.globalreporting.org).

(2). Intergovernmental Panel on Climate Change (www.ipcc.ch).

(3). International Energy Agency (www.iea.org).

ERNST & YOUNG

Independent verification statement

On the reporting procedures for environmental indicators

At the request of Airbus, we have reviewed the Group's reporting procedures relating to 2003 environmental indicators.

Airbus was responsible for preparing these environmental indicators in accordance with the reporting procedures, which are available at the Group's headquarters. Our responsibility is to report our findings concerning these reporting procedures on the basis of the work described below.

Nature and scope of our work

As agreed, we conducted the following tasks:

- we reviewed the Airbus reporting procedures with regard to their relevance, reliability, neutrality, understandability and completeness;
- we met with the individuals responsible for the application of the Group's reporting procedures at the corporate level (Environmental Affairs).

Such work did not include all the verifications specific to an audit providing a high or moderate level of assurance in accordance with the International Standards on Assurance Engagements, but still allowed us to report our findings and observations.

Findings on reporting procedures

Based on the work performed, our findings are consistent with the information relating to the "reporting scope and methodology" section presented by Airbus on page 48.

In the interests of further improvement, Airbus should take transport operations into account, specify reporting responsibilities for the calculation of the most complex indicators, and strengthen the reliability of the reporting procedure by reinforcing internal control procedures and improving reporting tools.

April 22nd, 2004

Eric Duvaud
Ernst & Young & Associés
Environment and Sustainability

Glossary

ACARE

Advisory Council for Aeronautics Research in Europe. It comprises about 30 members including representation from the Member States, the European Commission, manufacturing industry, airlines, airports, service providers, regulators, the research establishments and academia. Its primary mission is to establish and carry forward a Strategic Research Agenda that will influence all European stakeholders in the planning of research programmes.

AECMA

European Association of Aerospace Industries. It represents the aerospace industry in Europe in all matters of common interest on the level of aircraft/ systems, engines, equipment and components. Its objective is to enhance the competitive development of the whole sector. On April 22, 2004, the European Defence Industries Group (EDIG), the Association of the European Space Industry (EUROSPACE) and AECMA have announced their decision to merge and to form the AeroSpace and Defence Industries Association of Europe (ASD)

APU

Auxiliary Power Units. Small engines, usually in the back of aircraft, that enable electrical power supply and air conditioning and are used to start/restart the main engine.

CAEP

Committee on Aviation Environmental Protection. It is the ICAO body responsible for environmental issues.

CHP

Combined Heat and Power. A CHP plant is an installation where there is simultaneous generation of usable heat and power (usually electricity) in a single process. The avoidance of transmission losses allows reductions in primary energy usage and CO_2 emissions.

CNS / ATM

Communications Navigation and Surveillance/ Air Traffic Management systems. Future air navigation systems will provide solutions to enhance safety and alleviate congestion.

CO

Carbon monoxide. The result of incomplete combustion. For aircraft engines, the level of CO emissions depends very much on the thrust level: CO emissions are high per kilogram of fuel consumed at low engine power setting (taxi or approach) and low during take off or cruise.

CO_2

Carbon dioxide. The result of complete fuel combustion. The emission levels of CO_2 are directly proportional to the fuel burn, by a factor of 3.15.

Contrails

Streaks of condensed water vapour created in the air by an aircraft flying at high altitude.

CR VI

Hexavalent chromium. Used for its anti-corrosion properties.

Fly-by-wire controls

A flight control system that is electrically signalled by digital computers that use high levels of control laws. Airbus is at the centre of this revolutionary concept.

Footprint

Area with a given noise level at its perimeter. Noise levels are lower outside and higher inside this perimeter.

Greenhouse gases

Gases present in the atmosphere that have been produced either naturally or as a result of human activity. The main greenhouse gases are carbon dioxide (CO_2), nitrous oxide (N2O), methane (CH_4), hydrofluorocarbons (HFC), sulphur hexafluoride (SF_6) and perfluorocarbons (PFC). Greenhouse gas emissions are expressed in metric tonnes of CO_2 equivalent.
Greenhouse gases help make the earth habitable by warming it, but beyond a certain threshold, their accumulation creates detrimental global warming.

Global warming

The progressive gradual rise of the earth's surface temperature responsible for changes in global climate patterns. Global warming has occurred in the distant past as the result of natural influences, but the term is most often used to refer to the warming predicted to occur as a result of increased emissions of greenhouse gases.

IATA

International Air Transport Association. It brings together approximately 280 airlines, whose flights comprise more than 95% of all international air traffic. Its mission is to represent, lead and serve the air transport industry.

ICAO

International Civil Aviation Organisation. United Nations' agency for international civil aviation. One of its functions is to develop internationally binding standards for commercial aviation.

ICCAIA

International Co-ordinating Council of Aerospace Industries Associations.

IPCC

Intergovernmental Panel on Climate Change. Expert panel established by the United Nations Environmental Programme (UNEP) and the World Meteorological Organisation (WMO) to assess the consequences of the human-induced climate change.

ISO 14001

The ISO (International Standardisation for Organisation) 14001 standard establishes environmental organisation and management system requirements to prevent pollution and to reduce the effects of a given operation on the environment.

LROPS

Long Range Operations. LROPS can best be defined as a regulation that encompasses the design, certification and operation of any aircraft (irrespective of its number of engines) on long-range missions involving flight over remote and operationally challenging zones.

Montreal Protocol

The Montreal Protocol on substances that deplete the ozone layer is a landmark international agreement designed to protect the stratospheric ozone layer. The treaty was originally signed in 1987 and substantially amended in 1990 and 1992. The Montreal Protocol stipulated that the production and consumption of compounds that deplete ozone in the stratosphere – chlorofluorocarbons (CFCs), halons, carbon tetrachloride, and methyl chloroform – were to be phased out by 2000 (2005 for methyl chloroform).

MTOW

Maximum take off weight: maximum gross weight due to design or operational limitations at which an aircraft is permitted to take off.

Nacelle

Engine fairing. As an engine/airframe interface, nacelle regroups a number of systems and complex functions.

Noise margin

Difference between the actual noise level emitted and the maximum noise level permitted according to the regulation (for instance, Chapter 3 or 4). The margin is calculated in EPNdB.

NO_x

Nitrogen oxides. Collective name for various compounds of oxygen and nitrogen. NO_x (NO and NO_2) is produced from high temperature fuel combustion, mainly during take off and climb.

SO_x

Sulphur oxides. Collective name for various compounds of oxygen and sulphur formed in fuel combustion, the amount emitted depending on the sulphur concentration in the fuel.

TANGO

Technology Application to the Near term business Goals and Objectives of the aerospace industry. A 4 year EU research project started in 2000 and grouping 34 partners, including the 4 Airbus national entities. The aim is to achieve structural improvements through large scale validation of new materials, design, manufacturing and test technologies.

VOCs

Volatile Organic Compounds. Organic chemicals that easily vaporise at room temperature. VOCs include a wide range of individual substances, such as hydrocarbons, halocarbons and oxygenates. Generally considered as ozone precursors, they may contribute to the formation of urban smog through tropospheric photochemical processes.

FOR MORE INFORMATION, PLEASE CONTACT AIRBUS ENVIRONMENTAL AFFAIRS

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Philippe Fonta, Director Environmental Affairs, Business Coordination

FEEDBACK
Stakeholders dialogue is essential for continuously improving our EHS reporting process. We value your opinion on our report and welcome any suggestion on how to improve it. Please feel free to send us your comments or suggestions.

This report is printed on chlorine-free recycled paper.
An electronic version of this report is available at http://www.airbus.com
From 2005 onwards, EHS data will be published and regularly updated on line.

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