ANA, Thinking of People and Earth

Environmental Report

2004

ALL NIPPON AIRWAYS CO., Ltd
ANA Group

September 2004

ANA Group Management Principles

Corporate Philosophy

Our Commitments

On a foundation of security and reliability, the ANA Group will

- Create attractive surroundings for customers
- Continue to be a familiar presence
- Offer dreams and experiences to people around the world

Course of Action

1. Maintain top priority on safety
2. Customer oriented
3. Contribute to the society
4. Embrace new challenges
5. Debate with active interest, decide with confidence, and execute with conviction
6. Build a powerful ANA Group by effectively using human resources and focusing on teamwork as the competitive strength

Established April. 2004

Environmental Principles

Core efforts directed at the global environment

Basic Policy

We are always concerned with the global environment and limitation of materials, and we try to achieve their high value-added utilization to create a productive society.

Course of Action

1. We will evaluate the impact of our commercial activities on the environment, and persevere in our efforts to protect the environment.
2. We will observe environmental laws and regulations, and furthermore, think and act independently to protect the environment.
3. We will make our best efforts to minimize the environmental impact arising from operations of the airline industry.
4. We will make every effort to save energy and resources, to recycle articles, and to reduce waste.
5. We will contribute to the communities in which we live and work, through participation in social activities on environmental protection.
6. We will educate employees so that each may pay more attention to environmental protection.

Environment Committee

This ANA Environmental Policy is declared inside and outside company

Introduction

Sustainability for Society and Sincerity

All Nippon Airways Co., Ltd.
President and CEO
Yoji Ohashi
大橋洋治

The ANA Group has long considered environmental issues to be some of the most important aspects of company management, and has more actively addressed these issues throughout the *global environmental protection and group standard of behavior* plan. In 2003, we hosted the 1st international environment picture book competition and in 2004 our Global Environmental Conservation Promotion Department was renamed to Environmental Affairs department to promote further contribution to the communities through social activities, such as special coral reef preservation program in Okinawa, and nationwide activity of reviving wooded habitats.

Recently, Corporate Social Responsibility (CSR) is often mentioned; however, personally I do not consider that the CSR is a special issue. In my understanding, Corporate Social Responsibility occurs when all employees recognize that a corporation has to be fully accepted by society and that corporation contributes to the sustainable development of the society. As we address "Contribute to society" philosophy in our action plan, I believe that ANA group's CSR mission will be "Sincerity toward the society".

ANA Group, will continue being active in disclosing information on our corporate activities and implement opinions from business associates into our business operation. We also intend to continue putting "sincerity" efforts for the contribution to society and putting further efforts to gain your trust. We appreciate your special favor and suggestions on this matter.

September 2004

Regarding the 2004 Environmental Report

All Nippon Airways Co., Ltd.
Executive director and
Chairman of Environment
Committee
Chairman of CSR
promotion Conference
Syoushichiro Kubo

2003 was the first year for ANA Group to adapt a new 5-year environmental action plan, "ANA Group Ecology Plan". In the 2004 environmental report, we clearly describe ANA group's efforts and commitments based on the "Ecology Plan". Compiling this report, we focus on a few things: expansion of database, disclosure of information, introduction of the most advanced aircrafts (B7E7), therefore reducing CO2 emissions from aircraft operations and contribution to society as a sincere corporation. Through this report, we hope you will understand how the ANA Group addresses global environmental issues. We appreciate your opinions and suggestions on this matter.

September 2004

久保小七郎

Table of Contents

Unless noted otherwise, this environmental report describes the environmental situation of ANA (with exception of some overseas offices) and the following ANA Group companies as of fiscal year 2003 (1 April 2003 to 31 March 2004).

Group Companies	Air transport						Ground services			Aircraft maintenance									GSE maintenance			Others		
Items (Abbreviation)	All Nippon Airways ANA	Air Nippon ANK	Air Nippon Network A-net	Air Hokkaido ADK	Air Japan AJK	Nippon Cargo Airlines NCA	International Airport Utility IAU	Osaka Airport Service OAS	New Kansai Airport Service NKAS	All Nippon Airways Aircraft Maintenance ANAM	ANA Aircraft Techniques ANAAT	ANA Techno Aviation TAC	Tokyo Aviation Service TASCO	ANA Nagasaki Engineering NECO	ANA Aero Supply Systems AAS	ANA Engine Services AES	ANA Aero Thech ATEC	ANA Avionics AVIO	ANA Motor Service ANAMS	Osaka Airport Motor Service OAMS	Narita Engineering Service NES	Seiwa Service SAYWA	ANA Hotels ANAHTL	ANA Trading ANATC
Aircraft operation results	○	○	○	○	○																			
Fleet (operation equipment)	○	○	○	○	○	○																		
Environmental compliance	○	◇	◇	◇	◇	◇	○	○	○	○	○	○	○	○	○	○	○	○	○	○		○		
Environmental accounting	○	△	△		△																			
Global warming	○	△	△	△	△																			
Air pollution	○	△			△	△				△		△							△	△	△			
Noise	○	△			△	△																		
Waste and recycling	○	△								△		△		△										
Environmental conservation activities of group companies				○			○							○									○	○
Environmental data collection	○	○	○	○	○	−	○	○	○	○	○	○	○	○	○	○	○	○	○	○	−	○	−	−

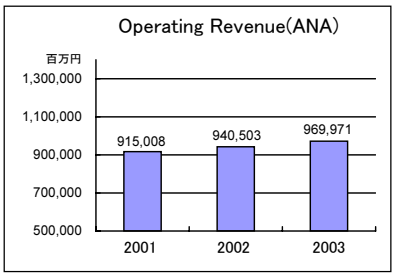
○Applies △Partially applies ◇Maintenance, handling and operation are entrusted to ANA Registered company names by the end of March 2004

Outline of ANA

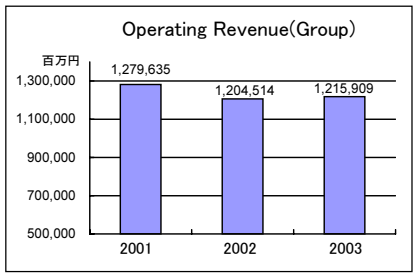
Company Name	ALL NIPPON AIRWAYS Co., Ltd. (Airline Code : ANA, NH)
Foundation	Dec. 1952
Head Office	Shiodome City Center, 1 -5-2, Higashi-Shimbashi, Minato-ku, Tokyo
President & CEO	Yoji Ohashi
Paid-in Capital	JPY 86,239million
No. of Employees	12,772 (Non-consolidated) employees
Operation Revenues	JPY969,971million
Core Business	Scheduled air transport service
The ANA Group	No. of subsidiaries : 134, No. of affiliates : 39

Operating Revenues

ANA

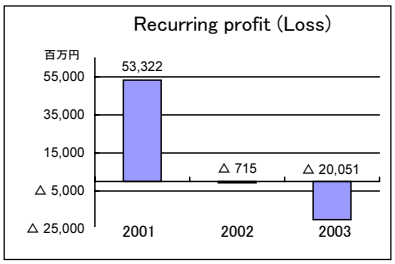


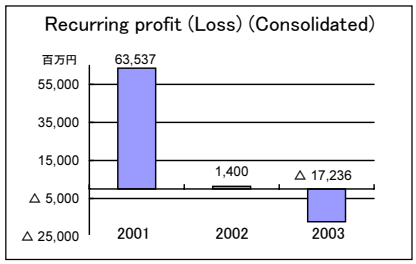
ANA Group



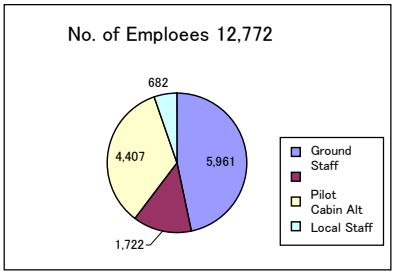
(JPY Million)

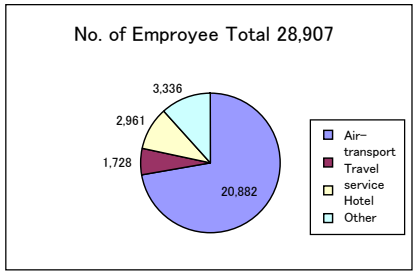
Recurring profit





Employees





ANA's principal group companies

Air transport
- Air Nippon Co., Lld. (ANK)
- Air Japan Co.,Ltd (AJX)
- Air Nippon Network Co.,Ltd.(Anet)
- Air Hokkaido Co.,Ltd.(ADK)
- Nippon Cargo Airlines Co,Ltd (NCA)

(Flight Support)
- ANA Aircraft Maintenance Co., Ltd
- ANA Skypal Co.,Ltd
- International Airport Utility Co.,Ltd.
- New Tokyo Int'l Airport Service Co.,Ltd.
- ANA Catering Service Co.,Ltd.
- ANA Telemart Co., Ltd.

Travel Services
- ANA Sales & Toures Co.,Ltd.
- ANAWorld Tours Co.,Ltd
- ANATravel Co,Ltd
- ANA Sky HolidayTours Co.,Ltd

Hotel Operations
- ANA Hotels Co., Ltd.
- ANA Hotel Tokyo Co.,Ltd.
- ANA Hotel Sapporo Co.,Ltd.
- Okinawa ANA Resort Co.,Ltd.

Other Businesses
- ANA Information Sys. Planning Co.,Ltd.
- Infini Travel Information, Inc.
- ANA Logistic Service Co.,Ltd.
- ANA Trading Co.,Ltd.
- ANA Real Estate Co.,Ltd.
- Saywa Service Co,Ltd.
- Jamco Corporation

City / Airport served by ANA Group (as of Mar.2003)

All Nippon Airwavs(ANA)

Wakkanai	WKJ	Washington D.C.	IAD
Memannbetsu	MMB	New York	JFK
Kushiro	KUH	Los Angeles	LAX
Asahikawa	AKJ	San Francisco	SFO
Sapporo	CTS	London	LHR
(Chitose)		Paris	CDG
Hakodate	HKD	Frankfurt	FRA
		Beijing	PEK
Akita	AXT	Tenjin	TSN
Sendai	SDJ	Dalian	DLC
Shonai	SYO	Shenyang	SHE
Niigata	KIJ	Xiamen	XMN
Narita	NRT	Qingdao	TAO
Tokyo	HND	Shanghai	PVG
(Haneda)			HGH
Toyama	TOY	Hong Kong	HKG
Komatsu	KMQ	Singapore	SIN
		Bangkok	BKK
Nagoya	NGO	Ho Chi Minh City	SGN
Kansai	KIX		
Osaka	ITM	Air Nippon(ANK)	
(Itami)		Taipei	TPE
Tottori	TTJ		
Yonago	YGJ	Air Japan(AJX)	
Okayama	OKJ	Honolulu	HNL
Hiroshima	HIJ	Guam	GU
Yanaguchi-ube	UBJ	Seoul	ICNM
Takamatsu	TAK		
Kochi	KCZ		
Matsuyama	MYJ		
Fukuoka	FUK		
Saga	HSG		
Nagasaki	NGS		
Kumamoto	KMJ	(Noto**) Airport opened Jul. 2003 and by ANK	
Oita	OIT	Aomori, Tokushima, Asahikawa: Not fly as of Aug. 2003	
Miyazaki	KMI		
Kagoshima	KOJ		
Okinawa	OKA		

Air NiDoon(ANK)

Monbetsu	MBE
Nakashibetsu	SHB
Odate-Noshiro	ONJ
Fukushima	FKS
Noto	NTQ
Oshima	OIM
Hachijojima	HAC
Iwami	IWJ
Tsushima	TSJ
Fukue	FUJ
Miyakojima	MMY
Ishigakijima	ISG

Air Nippon Networkt(Anet)

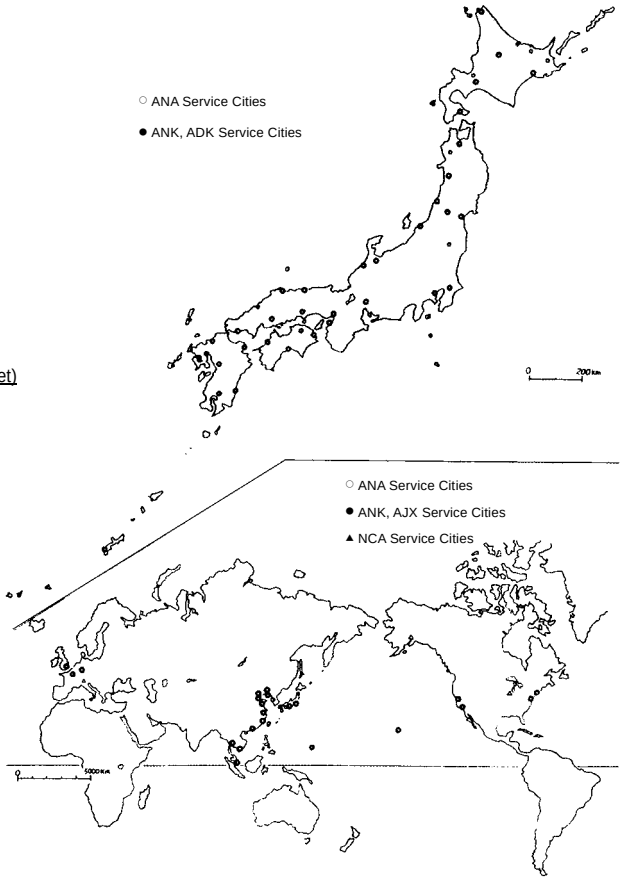
Rishiri	RIS
Sapporo	OKD
(Okadama)	
Miyakejima	MYE

Air Hokkaido(ADK)

Okushiri	OIR

Nippon Cargo Airline(N)

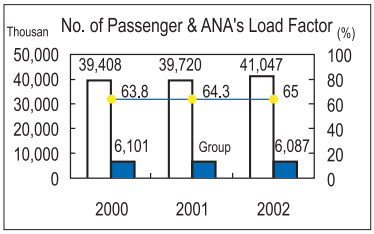
Anchorage	ANC
Chicogo	ORD
Indianapolis	IND
Amsterdam	AMS
Milan	MXP
Mnila	MNL
Kuala Lumpur	KUL

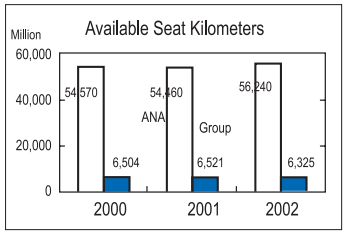


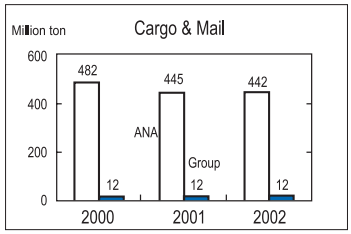
Flight Operation (2002 Fiscal)

	Domestic	International	Total	
No. of Flight ANA	200,642	22,358	223,000	
Total ANA Group	290,464	24,421	314,885	
Flight Length ANA	174,183	99,097	273,280	(1000 km)
Total ANA Group	225,079	102,791	327,870	(1000 km)
Flight Hour ANA	290,722	113,465	404,1 87	(Hr)
Total ANA Group	386,803	1 18,248	505,051	(Hr)

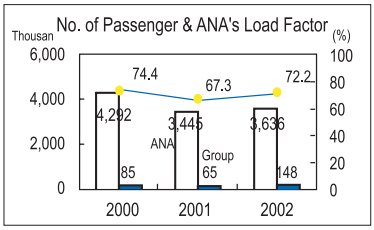
Domestic Service

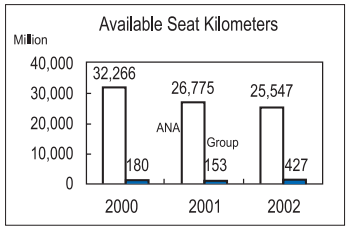


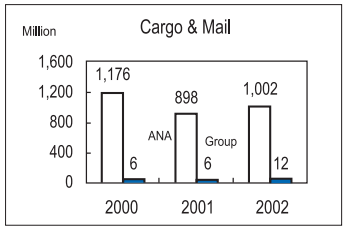




International Service



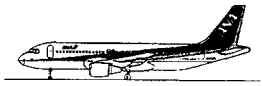




(Except Charter Flight) Group = Domestic: ANK, ADK, Anet
International: ANK, AJX + Code-Share Flight

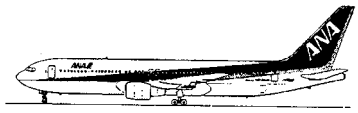
ANA fleet

(As of Mar. 2003)

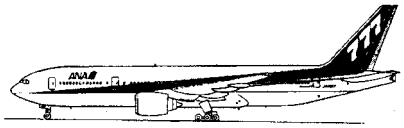


Aircraft Type (No. of seats)	No. (Change)	ENG Type	Ave. Age	ICAO Noise Standard conformity to Chapter 3/4 **
A320 (166)	28 (±3) *Include ANK	CFM 56-5A1	9.9	Ch-3/4

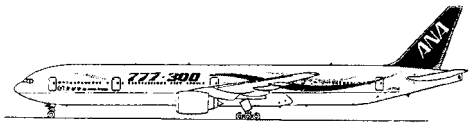
A321 (195)	7 (±0)	V2530-A5	5.0	Ch-3/4



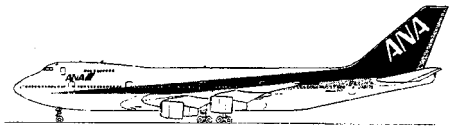
B767-300 (216-288)	52 (+2) *Include Air Japan (AJX) and ANK	CF6-80C2B-2 /B6/B6F	10.4	Ch-3/4



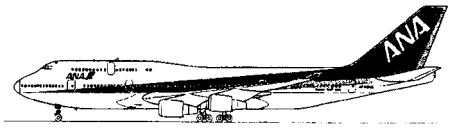
B777-200 (234-382)	16 (±0)	PW4074/4077 /4090	6.4	Ch-3/4



B777-300 (477-525)	7 (±0)	PW4090	4.4	Ch-3/4

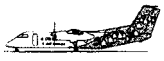


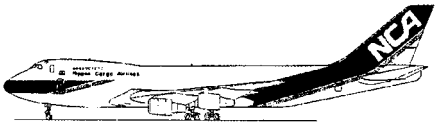
B747-200B (310-377)	2 (±0)	CF6-50E2	17.8	Ch-3
B747SR (455～536)	7 (-1)	CF6-45A2	22.8	Ch-3



B747-400 (320-569)	23 (±0)	CF6-80C2B1F	10.2	Ch-3/4
Total	144 (+5)		11.4 (+0.7 : diff. with the previous year)	

Group airlines Fleets

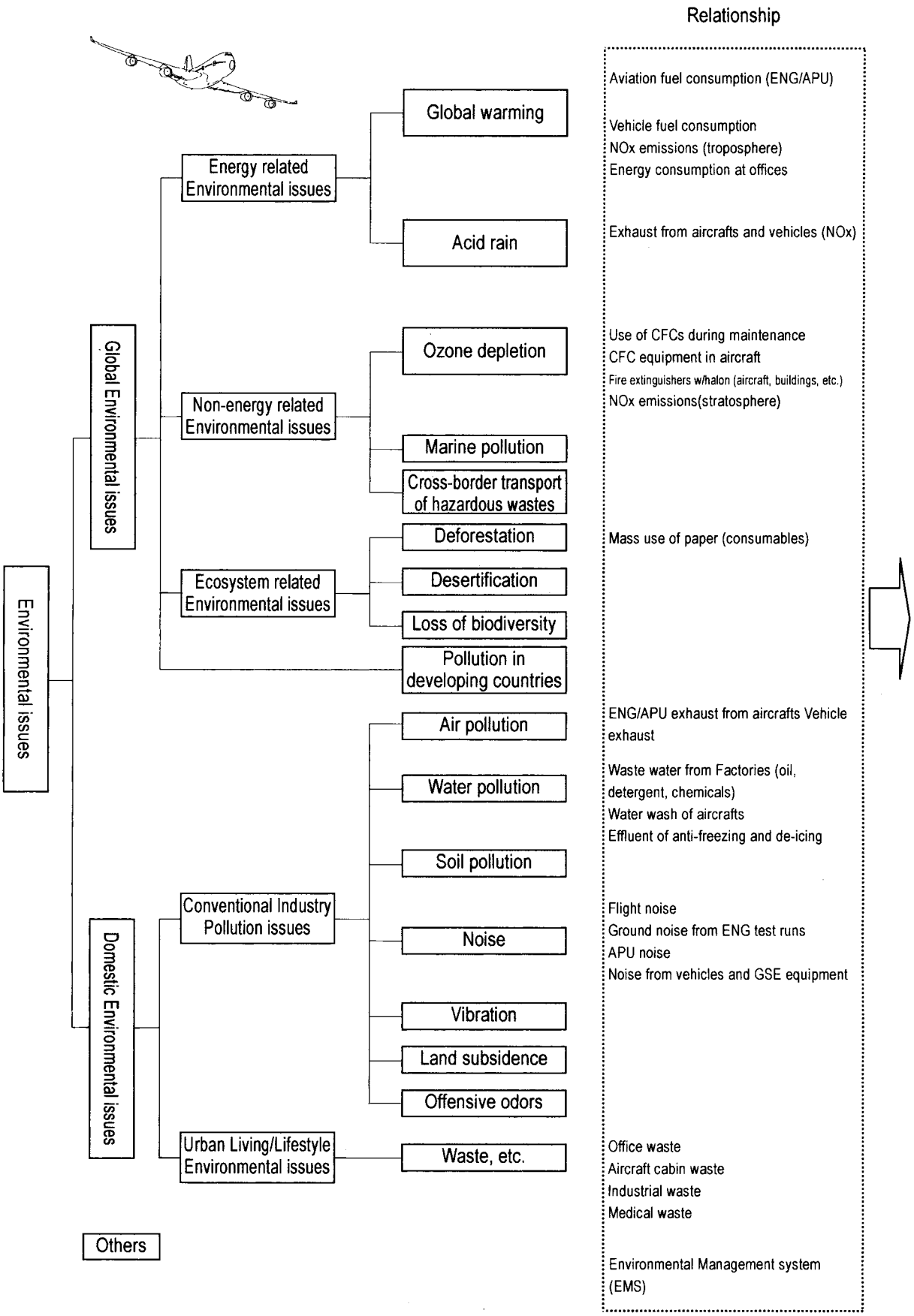




Aircraft Type (No. of seats)	No. (Change) Operating Airline	ENG Type	Ave. Age	ICAO Noise Standard conformity to Chapter 3/4 **
DHC-6-300 (19)	1 (−1) Air Hokkaido (ADK)	PT 6-27	34.0	−
DHC-8-300 (56)	5 (+1) Air Nippon Network (Anet)	PW-123B	2.1	−
DHC-8-400 (74)	3 (+3) Air Nippon (ANK)	PW-150A	0.6	−
B737-500 (126-133)	25 (+0) Air Nippon (ANK)	CFM 56-3C1	7.7	Ch-3/4
B737-400 (168-170)	2 (±0) Air Nippon (ANK)	CFM 56-3C1	10.7	Ch-3/4
B747F/SRF (Cargo capacity 758m^3)	11 (±0) Nippon Cargo Airlines (NCA)	CF6-50E2	17.5	Ch-3

** ICAO Chapter 4 - New standard for after 2006 newly type certification (Ref. P.37)

How airlines are related to the environment



Laws and regulations

UN Framework Convention on Climate Change "Kyoto Protocol"
'Law to promote measures to counter global warming'
Federation of Economic Organizations Voluntary Action Plan for Airlines**
Targeting on 10 percent reduction of CO_2 emission in 1990 per available seat kilometer (ASK) by 2010
* Introduction of "Environmental Tax (Carbon Tax)"
Reinforcement of "Law of Energy saving"* **or "Law Concerning the Rational Use of Energy"

"Law of Air Pollution Control"
* "Law of Automobile NOx and SPM" and Green tax system* **
* Ordinances of Tokyo and Chiba governments for the "Regulation of automobile exhausts and operations"* **

"Vienna Convention", "Montreal Protocol"
"Law of Ozone Layer Protection", "Freon Recovery and Elimination Law"
Banning the production of CFCs and halons, production ban on CFC alternatives by 2020 "Fire Law"

"Basic Law for promoting the formation of a recycling-oriented society"**
"Law on promoting Green Purchasing"*

"Washington Convention"

ICAO Aircraft Emission Regulation, "Civil Aeronautics Law/ Airworthiness Certificate"**
* "Air Pollution Control Law"*

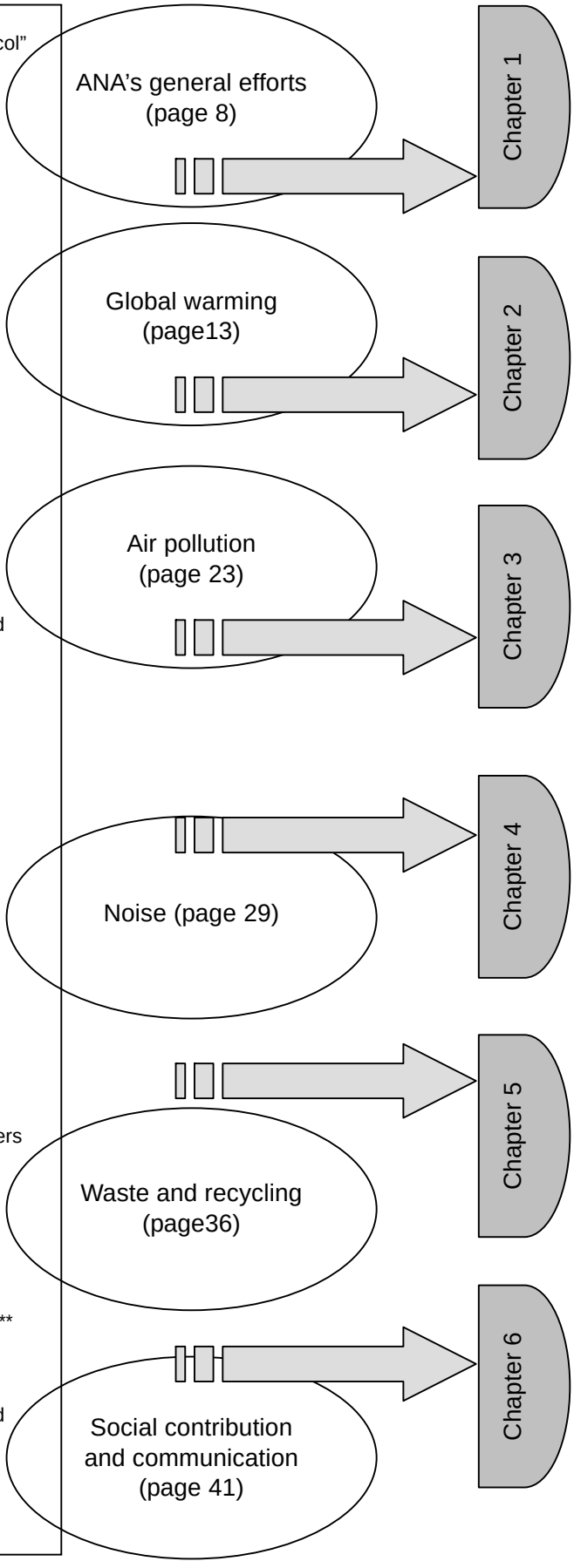
* "Water Pollution Control Law"*
* "Sewage Law"*
"Natural Environment Conservation Law"

"Law on Soil Pollution Measures"**

* ICAO noise regulation, "Civil Aeronautics Law/ Airworthiness Certificate"* **
"Airport Management Regulations", Guide for curfew and others
"Environmental Standard for aircraft noise"
* "Labor Safety and Sanitation Law"*
"Noise Control Law", "Vibration Control Law"

* "Waste Treatment and Cleaning Law (general, industrial, medical)"* **
* "Pollutant Release and Transfer Register (PRTR) Law", "Chemical Safety Data Sheet (MSDS) Law"* **
* "Labor Safety and Sanitation Law"*
"Basic Law for promoting the formation of a recycling-oriented society", PCB Treatment Law"**
Law to Promote Recycled Resource Use Law", "Law for Recycling Containers and Packages" and others**

Information disclosure, Propaganda effect



Note:
* Items with some penalties (such as information disclosure)
** Recently implemented and reinforced laws and regulations

Chapter 1 ANA's environmental efforts

<ANA's commitments and achievements>

ANA adopted the "ANA Group Corporate Philosophy" in 2002 (refer to the end of this book for details.) and declared that ANA will always carry out its business in an open and fair manner so that it can contribute to the shareholders and society at large as well as to the environment. In 2003, we released the "ANA Group Ecology Plan" which was developed from the previous mid-term plan to promote an independent and clear commitment by predicting social demands and also to publish previous results.

1. Corporate Philosophy and Group Standard of Behavior

ANA Group posts at each office *the ANA Group Corporate Philosophy*, which contains basic policy and course of action, in addition to that, a portable copy was distributed to each employee to carry around, to encourage each employee to remember that philosophy. We also instituted *the ANA Group's Standard of Behavior*, "Our commitment", as a subsidiary set of regulations to meet our high ideals as sincere and reliable corporate citizen, in addition to following the existing rules and regulations.

ANA Group's Standard of Behavior (Excerpted)

Relationship with society

Environmental safety

We recognize that our environmental efforts are an essential requirement for our corporation itself and our corporate activities. We act in independent and positive manner. (Snip)

Social contribution

We consider that for our company to continue doing business as a part of society, we have a responsibility to contribute to social development, which is entirely different from contributions in the business fields. (Snip)

2. Environmental and Social Activities

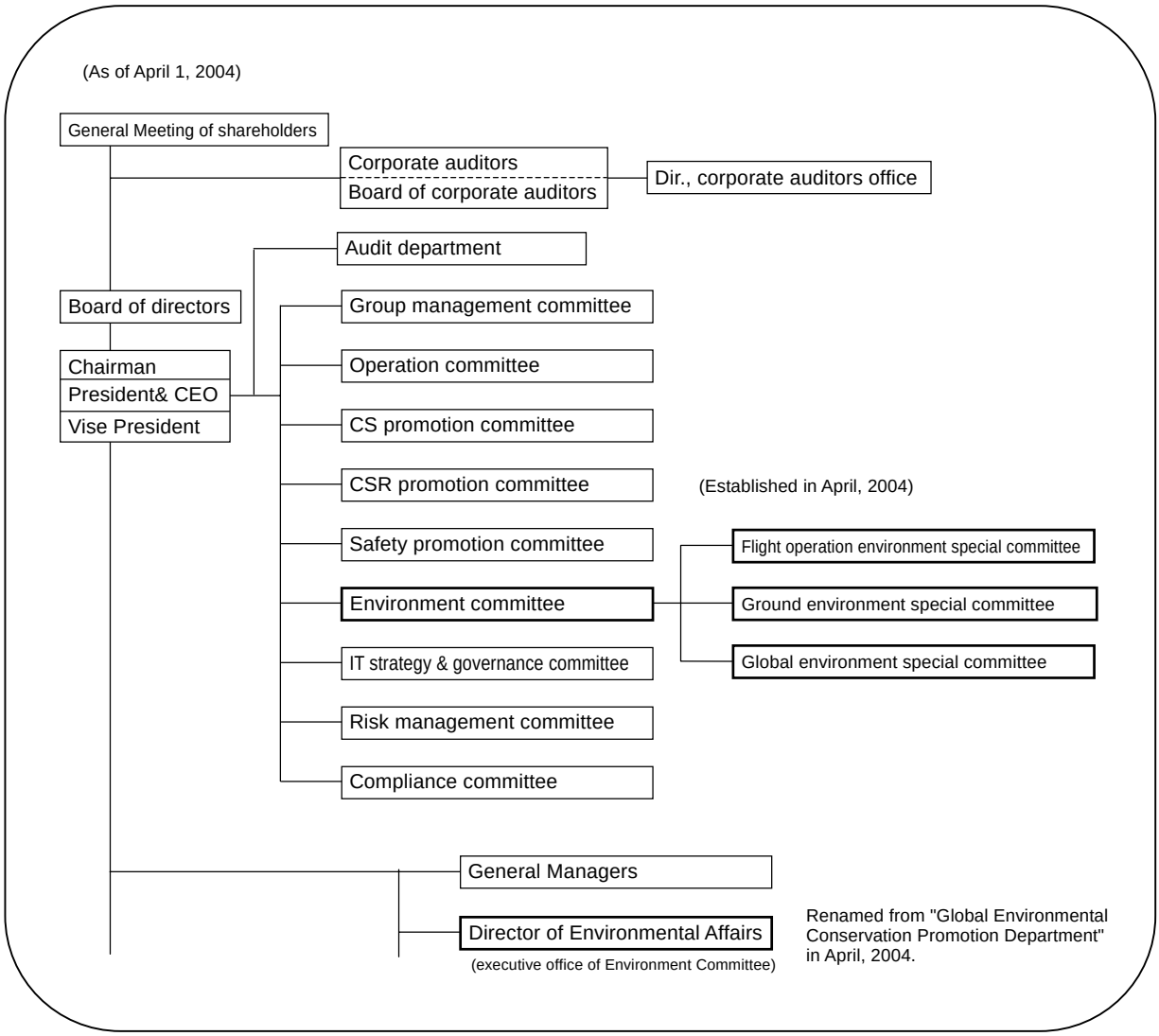
(1) Environmental Milestone

ANA has taken the lead in addressing environmental issues by focusing on the problems of noise and pollution since 1970's. Since 1990's, when environmental issues have become a universal subject; we organized our corporate structure in a flexible way, to be able to respond to global environmental demands.

Month/Year	Corporate structure dealing with environmental and social issues, and significant events.
November, 1973	Established *the Airport Division* at the Head Office to oversee ANA's environmental activities.
February, 1974	Established the *Committee for Environmental Measures* as an advisory committee reporting to the president. * Formed subsidiary organizations under this Committee, including *Specialty Committees* dealing with each of the following: flight noise, ground noise/air pollution, factory waste water; and comprehensive assessment measures.
July, 1990	Established the *Environmental Conservation Promotion Office* to address global environmental issues through conventional pollution source measures. * Specialty committees were reorganized into three: flight noise; ground noise/pollution; and energy saving measures. The specialty committee for energy savings was renamed the *Specialty Committee for Global Warming Measures* in 1993.
May, 1993	*Environmental Conservation Promotion Office* started the annual publication of *ANA Environmental Report* (since 1992).
June, 1999	Renamed the *Environmental Conservation Promotion Office* to *Global Environmental Conservation Promotion Department,* and the *Environmental Measures Committee* to *Global Environment Committee.* Renamed other environment-related committees to the Specialty Committees for: Global Environmental Flights, Ground Environment, etc.
October, 1999	Formal entry into Star Alliance. * In May, 1999, participated in *Star Alliance Environmental Declaration*.
April, 2004	Renamed *Global Environmental Conservation Promotion Department* to *Environmental Affairs Department*. Established the *CSR Promotion Conference*.

(2) Current organization

Not sticking with a conventional environmental approach, in April 2004, ANA renamed *Global Environmental Conservation Promotion* department to *Environmental Affairs* in order to promote social contribution as a good corporate citizen. In addition, we recently established the inter-organization committee, *CSR Promotion Conference*.



3. "ANA Group Ecology Plan (2003-2007)"

2003 was the first year of enforcement of *ANA Group Ecology Plan* which was introduced in March, 2003. Although it is a 5-year plan, we can achieve substantial results for the first year by proactively applying much effort; we can implement our plans as soon as possible. We will put additional effort into solving the rest of the issues after 2004. In the following table, we describe our main 2003 activities along the ecology plan.

ANA Group Ecology Plan (2003-2007) and its review of 2003

Item group	Item	Review of 2003
Promotion of Environmental Management	**<ISO14001>** Develop environmental management systems based on ISO 14001 throughout the Group	ANA Group developed a new *ANA Group Ecology Plan* and promoted the collection of environmental data regularly, as well as implemented the environmental law in compliance with the requirements of ISO 14001 standard. These requirements are as follows: development of environmental policy, identification of aspects, identification and maintenance of legal requirement and enforcement, and management of our goals.
	<Environmental Accounting> Implement Group environmental accounting system	Purchasing and operating of ANA Group Company's aircrafts- Air Nippon, Air Japan and Air Nippon Network- is covered under environmental accounting.
	<Environmental Compliance> Strengthen legal management and promote the thorough compliance with relevant laws and regulations	Verified the compliance situation of relevant laws and regulations with total 46 offices, adding 7 ANA Group companies (In-house: 30 locations, group company: 16 locations) in the fiscal year 2003.
	<Environmental Communication> Provide Environmental Reports that are easy to read for our stakeholders, and address their comments and opinions within our environmental management	We announced the results of environmental management ratings, provided by the third party in Japan and U.S., and aim to perform environmental management in a transparent way. Started to providing information of our environmental activities through the in-flight magazine *Tsubasa no Okoku (Wingspan)* and the internet channel *Channel J*.
	<Group companies> Promote environmental management together in a transparent way	Promote the disclosure of information and environmental vision through *ANA Group Environmental Network* and internal intranet, *Group KWIN*.
Global Warming Mitigation Measures	**<Reduction of CO_2 emissions from aviation fuels>** 12% reduction in CO_2 emissions per seat-kilometer by 2007 from 1990 levels	We reduced the CO_2 emissions in 2003 by 10.3% over the original goal of 12%. Purchasing newer aircraft, the introduction of the *Economize Fuel Motion Method (EFP),* and fuel consumption measures (e.g. regular engine wash) contributed directly to this result. We will continue to strive for the greater emission control in order to achieve our goal in 2007.
	<Reduction of energy consumption at business locations> 5% reduction of power and thermal energy consumption at business locations in comparison to 2002 levels	Although our whole group's total electricity usage, major form of energy consumption, was 102% over the previous year, it was only 92% over the previous year in training and aircraft maintenance centers. There was nearly 10% conservation at the training center and aircraft maintenance center, which are the largest energy consumption sections.
Air Pollution Measures	**<Reduction of aircraft HC emissions>** Retire engines not conforming to ICAO's standard for engine emissions	The level of hydrocarbon (HC) emission from a part of B747SR/LR aircraft's engine that ANA owns are over the ICAO's standard. ANA has decided to retire those engines by 2006.
	<Introduction of low pollution vehicles> Double the ratio of low pollution cars and low emission gas vehicles	In 2003, the number of low pollution/low emission vehicles was 106% of the 2002 number, due to the purchase of 7 additional vehicles.
	<Ozone layer protection measures> Maintain zero emission of regulated substances	In regards to the designated fluorocarbon solution (one of the ozone depleting substances), by retiring the ANK YS-11 aircraft in august 2003, we no longer use that substance. In regards halon in the fire extinguishers, we introduced the recycling system that by 2004 will check and dispose of such fire extinguishers at our maintenance facility. We are aiming for zero emission.
Abatement of flight noise	**<Conformity with ICAO's noise standard (Chapter IV)>** Make all aircrafts conform to the Chapter IV noise standard by 2007	Retire current B747LR, which is chapter 3 standard aircraft in December 2005, and B747SR in March 2006. We aim for all aircrafts to conform to ICAO's noise standard (Chapter IV) by 2006.
Realization of Resource Recycling	**<Waste reduction>** Aim for zero emissions in the future, annually disclose recycling results, and achieve 15% ratio of final disposal volume for industrial wastes by 2007	Concerning recycling of industrial waste, we extended the recycling of plastic covers, to the cargo departments of Haneda and Itami airports, from 2003. We have been collecting detailed data about the amount of final disposal.
	<Promote green purchasing> *Green purchasing* for 100% of copy paper, and 80% of other office supplies by the end of 2007	The percentage of *green purchasing* for office supplies was 63% and the percentage of using recycled copy paper was 47%.
	<Reduction of chemical use> Develop alternatives for PRTR-controlled substances, and annually disclose the reduction results	We reduced PRTR substances by changing the paint remover, detergent and paint items (10 items) for aircraft's body and landing gear and by changing aircraft detergent (3 items).
Promote *Aozora*, which means Blue Sky (social contribution activities for the environment) Campaign	**<Picture books about environment>** Annually hold an International Environmental Picture Book Competition	We hosted the 1st International Environmental Picture Book Contest and collected the total 431 entries from inside Japan and 12 foreign countries. Published 100,000 copies of the first prize book and distributed these copies out on various ANA flights, inside company branches, and educational institutions.
	<Reforestation projects> Promote *green activities* in and out of Japan	ANA group's company employees administered *green activity* around the Chitose Airport in June 2003 as a trial for a planned similar large scale activity in 2004.

4. Environmental laws, regulations and compliance

To fully embrace our corporate social responsibility, and extend the scope of corporation's responsibilities, ANA group promotes research into how to maintain compliance with environmental laws and regulations and then uses this information to best structure corporate operations. In 2003, additional 7 group companies were added to the scope of the abovementioned research, subsequently, the number of locations that are in compliance with environmental laws and regulations now stands at 46 (30 at ANA and 16 at group companies). As a result, ANA discovered 265 cases of some conflict with environmental laws and regulations. (See details below); however, there were no cases of environmental accidents, legal penalties or litigation.

Specific activities undertaken to comply with environmental laws and regulations:

1. Clarify the environmental laws and regulations applicable to each business location.

   As a result, the items which must be managed by operations of each business locations are clarified and thus reduced the risk of unknowingly breaking the law.

2. Improved operational procedures at each business locations along with formulation and correction of the laws and regulations.

   To respond appropriately to the requirements of the laws and regulations, operational procedures at each business locations were improved, especially concerning the law related to waste generation. We renewed old contracts and added a new one with a company providing waste disposal services. As a result, we prevented the illegal disposal of waste, and thus greatly reduced the risk of being held responsible for generating illegal waste.

3. Promoted recycling of waste.

   To exceed the requirements of laws and regulations, we promote the recycling of waste instead of simply disposing of it in a landfill. For example, the plastic cover used for cargo operation at the major airports in Japan is recycled to produce plastic fuel and plastic bags. We also promoted the maintenance of waste yards, and introduced the metal can and plastic material waste compressors. As a result, we could keep in line with the laws and regulations and more importantly, we achieved effective environmental improvement measures.

		2002	2003
	Number of surveyed business locations	39	46
	Name of Law	Number of locations in compliance.	
1	Law for the re-manufacture of specific home appliances (Home Appliance Recycling Law)	37	45
2	Waste Management and Public Cleansing Law	37	45
3	Law Concerning the Protection of the Ozone Layer through the Control of Specified Substances and Other Measures (Ozone Layer Protection Law)	25	34
4	Law for ensuring the implementation of recovery and destruction of fluorocarbons related to specified products (Fluorocarbons Recovery and Destruction Law)		
5	Law concerning special measures for promoting appropriate treatment of polychlorobiphenyl wastes		
6	Law concerning reporting, etc. of releases to the environment of specific chemical substances and promoting improvements in their management (PRTR Law)		
7	Law for the rational use of energy (Energy Saving Law)		
8	Air Pollution Control Law		
9	Law concerning special measures for total emission reduction of nitrogen oxides and small particles from automobiles in specified areas (Automobile NOx-PM Law)		
10	Water Pollution Control Law		
11	Sewage Control Law		
12	Septic Tank Control Law		
13	Noise Regulation Law		
14	Vibration Regulation Law		
15	Offensive Odor Control Law		
16	Factory Allocation Law		
17	Law for developing pollution prevention organization at specified factories (Pollution Prevention System Development Law)		
18	Toxic and Hazardous Substances Regulation Law		
19	Container and Packaging Recycling Law		
20	Building Material Recycling Law		
21	Vehicle Recycling Law		
	Tota	212	265

Management of industrial waste yard, in compliance laws and regulations at Osaka Airport Motor Service.

In fiscal year 2004, with the assistance of experts in the related fields, we will continue to survey and evaluate the situation dealing with industrial waste disposal to ensure the legality of our industrial waste disposal program (See chapter 7). We will also expand the list of participating group companies.

5. Environmental Accounting

To quantitatively determine the cost of environmental conservation activities, ANA introduced its Environmental Accounting system starting in fiscal year 2001. Subsequently every year, we increased the scope of the accounting system.

2001- The accounting results cover all ANA airport branches, and main offices of the corporate headquarters

2002- The accounting results cover all ANA companies in Japan including marketing divisions at branch offices. Specifically regarding the introduction of energy saving aircraft and the use of ground power units (GPU) for parked aircraft, the accounting record covers group companies such as Air Nippon (ANK) and Air Japan (AJX)

2003- The accounting record covers Air Nippon Network (AKX), one of ANA group companies.

ANA Environmental Accounting Record for fiscal year 2003

Environmental Cost Items		Costs	Major Activities
Costs at each site	Pollution prevention costs	771	Sewage treatment costs Appropriate effluent treatment
	Global environmental conservation costs	13,342	Introduction of energy-saving aircraft Use of ground power while parked
	Resource recycling costs	714	Appropriate waste treatment Reduction, sorting and recycling of wastes
Upstream and downstream costs		62	Green purchasing for cabin service goods Purchasing of treated water Measures to comply with packaging recycling law
Management activity costs		5,721	Cleaning of aircraft's interior Labor costs for environmental management Environmental education
Research and development costs		0	Research and development of environmentally friendly equipment
Social activities costs		153	Environmental Picture Book Competition Raising awareness for wildlife protection
Environmental damage recovery costs		-	Not applicable
Total		20,763	(unit: million Yen)

Covered divisions:
Whole company and divisions of All Nippon Airways Co. (Except overseas branches)
For the procurement of energy saving aircraft:
Air Nippon, Air Japan and Air Japan Network

Period:
Fiscal Year 2003
(April 1, 2003 - March 31, 2004)

Reference:
Guideline of the Ministry of Environment

Environmental Accounting: Accounting system to measure and analyze environmental conservation costs incurred through business activities, in a quantifiable way. In this report, only environmental costs are summarized.

More than 80% of total global environmental conservation costs of 13,342 million Yen was for the purchasing and leasing of energy-saving and lower noise aircraft.

The ANA Group appropriates 10% of its depreciation costs and leasing costs of aircraft for environmental accounting.

6. ISO 14001 Environmental Management Certification

Certificate of Approval

Awarded to

NARITA MAINTENANCE CENTER, ENGINEERING & MAINTENANCE
ALL NIPPON AIRWAYS CO., LTD.
COMPANY DETAILS ARE SHOWN ON THE APPENDIX

Bureau Veritas Quality International certify that the Management System of the above operator has been assessed and found to be in accordance with the requirements of the environmental standards and operational scope detailed below

ENVIRONMENTAL STANDARDS

ISO 14001:1996
JIS Q 14001:1996

OPERATIONAL SCOPE

MAINTENANCE OF LARGE AIRCRAFT

Original approval date: 13 FEBRUARY 2002

Subject to the continued satisfactory implementation of the operator's Management System, this Certificate is valid for a period of three years from:

13 FEBRUARY 2002

Date: 19 FEBRUARY 2002

Managing Office:
Bureau Veritas Quality International
Japan Central Office
Sannomiya Kokusai Bldg. 8F, 2-1-30,
Harnabe-dori, Chuo-ku,
Kobe, Japan 650-0033

UKAS ENVIRONMENTAL MANAGEMENT

For Bureau Veritas Quality International (Holdings) S.A.,
2nd Floor, Tower Bridge Court
224-226 Tower Bridge Road
London SE1 2TX

Certificate No: 105252

In February 2002, ANA acquired ISO 14001 (Environmental Management System) certification from UKAS, a UK-based review and registration organization, for the Narita Maintenance Center of Maintenance Division, which is the center of ANA's international fleet. ANA was the first aircraft handling business in Japan to attain certification. Using the knowledge acquired through the certification process, ANA exerts every effort to promote environmental conservation throughout the ANA Group.

In March 2004, ANA Hotel Okinawa Harbor View Hotel acquired ISO 14001 certification.

Chapter 2 Global Warming

＜ANA's commitments and achievements＞

In fiscal year 2003, ANA produced approximately 7,000,000 tons of CO2, 98% of which came from the consumption of aviation fuel. In the *Ecology* plan, we set a goal to reduce CO2 emissions per available seat kilometers over 1990 levels by 12%. We achieved 10.3% reduction by 2003. Last year's introduction of *Economical Fuel Motion Method (EFP)* and regular engine cleaning, as well as the introduction of new aircraft contributed to this reduction. We will keep more putting efforts to meet our target by 2007.

1. Global warming and airline's responses

(1) Kyoto Protocol and global warming

Elements of "Kyoto Protocol" that apply to airlines are listed below. Background on prevention of global warming and the countermeasures after 1997 are shown on the reference page 3 at the end of this chapter. The general outline of IPCC Special Report is shown on the reference page 1.

Important elements of "Kyoto Protocol"

(1) Greenhouse gases of concern: Six types (CO2, CH4,N2O,HFC,PFC,SF6)

(2) Target year/period: First commitment period is for five years from 2008 to 2012

(3) Quantified targets: At least 5% reduction from 1990 levels for total Annex I countries' emissions in carbon dioxide equivalent (Japan-6%, EU-8%, US-withdrew)

(4) Incorporation of carbon sinks: Limited to the sinks from reforestation after 1990

(5) Kyoto Mechanisms:

1. Joint Implementation by Annex I countries: Allows joint implementation of projects between Annex 1 countries.
2. Emissions Trading: Allowed between Annex I countries
3. Clean Development Mechanism (CDM): Designed to provide aide to non-Annex I countries, and to support Annex I countries' efforts to comply with targets

(6) Bubble: Allow the bubble (EU) if legal responsibility relationship is specified

(7) Banking and borrowing: Quantity of excess reduction can be forwarded to the next commitment period.

(8) Does not allow borrowing (insufficient reduction quantity to be advanced from the next commitment period)

Condition of Kyoto Protocol's entry into force: After ratified by 55 or more Parties to the Convention (however, the total emissions quantity of ratified Annex I countries must be 55% or more of the total emissions quantity of Annex I countries), enter into force 90 days later.

(2) Domestic Background

Japan set a target of 6% reduction of greenhouse gas average emission from 1990 levels from 2008 to 2012, established the "Guidelines for Measures to Prevent Global Warming" in 1998, and enforced the revised Energy Saving Law in April 1999. In January 2002, the government reviewed the Guidelines for Measures to Prevent Global Warming and ratified the Kyoto Protocol in June 2002, following which it then approved the new Guidelines for Measures to Prevent Global Warming.

The percentages of CO2 emission by sector in Japan for fiscal year 2002 are shown on the figure 2-1. Comparing these shares with the numbers from fiscal year 2002, the residential sector share increased, the transport sector share slightly increased but the industrial sector share decreased.

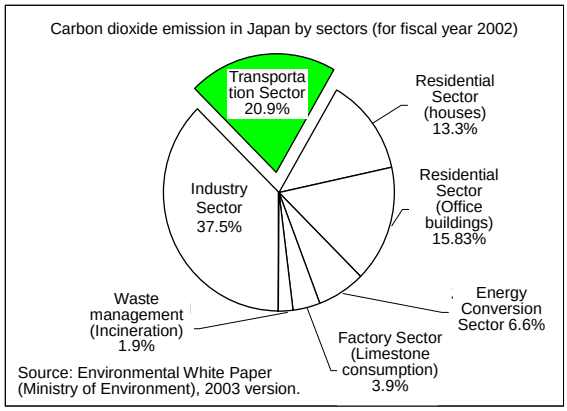


Fig. 2-1 Shares of carbon dioxide emissions in Japan by sector

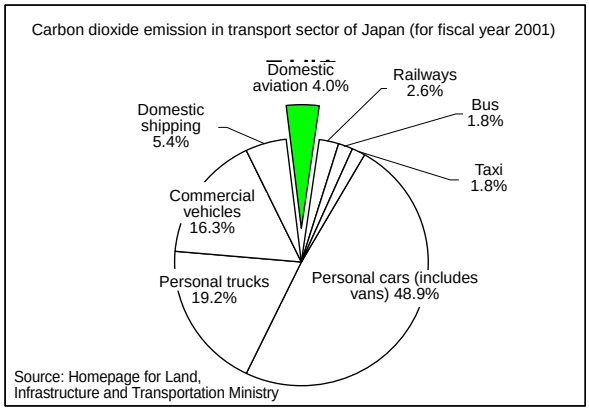


Fig. 2-2 Transport sector's shares of carbon dioxide emission

Among ANA's businesses, functions that emit greenhouse gas include aircraft operations, ground maintenance of aircraft/engines, and office activities."

The types of greenhouse gases emitted from aircraft operations include CO2 (carbon dioxide), NOx (nitrogen oxides, increase in tropospheric ozone), water steam (formation of contrails), CFC (chlorofluorocarbon), HCFC (hydrochlorofluorocarbon), and others. Aircraft do not emit other greenhouse gases of concern in the Kyoto Protocol, such as CH4 (methane), N2O (Nitrous Oxide), and PFC (perfluorocarbon).

In this chapter, we discuss CO2 emissions which take 93.7% of total greenhouse gases exhausted in Japan. (Environmental White Paper issued by Ministry of Environment, 2003 version)

According to ICAO statistics, the worldwide quantity of aviation CO2 emissions is about 3.0-4.0% of total fossil fuel CO2 emissions. The share of CO2 emissions from domestic aviation in Japan was about 4.0% of the transport sector in fiscal 2001, and about 0.8% of the total industrial sector emissions. Therefore, aviation's contribution to global warming seems extremely low at this point (please refer to Fig. 2-2).

In September 1996, the Keidanren (Japan Federation of Economic Organizations) requested airline companies to prepare a voluntary action plan on environmental conservation (CO2 emission reduction targets with concrete measures for reduction) and three airline companies, ANA, JAL, and JAS determined the target value for CO2 emissions at about a 10% improvement from 1990 levels in transport units (available seat-km) by 2010. In addition, they established the main approaches they would take as concrete measures to achieve target values, including the promotion of renovation of old aircraft and introduction of new aircraft types with improved fuel consumption, active introduction of FANS (futuristic air navigation system, CNS/ATM etc.), and the implementation of routine service practices with less fuel consumption.

(3) ANA CO2 (Carbon dioxide) reduction measures

ANA Group Ecology Plan

In March 2003, ANA developed its *ANA Ecology Plan*. (For the details of the plan, refer to Chapter1.) The plan includes the following action items to address the reduction of CO2 emission, which is a major cause of global warming:

1. Decrease CO2 emissions from aviation fuels
2. Reduce the amount of energy consumed at offices and business sites.

Regarding the consumption of aviation fuels, which is the largest CO2 emissions source in our business; we greatly revised our original target that was stated in the voluntary plan. The following revisions were made with the purpose of increasing our fuel efficiency.

"ANA will reduce CO2 emissions per available seat-kilometer by 12% from the 1990 levels by 2007"

original target, in the voluntary plan was 10% reduction in CO2 emissions per available seat-km from the 1990 levels by 2010.

2. Aircrafts (or aviation) energy saving measures

(1) CO_2 emissions

ANA's CO_2 emissions from aviation activities were equivalent to approximately 1.87 million tons of carbon in 2003 (approx.6.85 million tons of CO2). For airline companies, there is no appropriate alternative for current fossil fuels; therefore, we must use fuels efficiently. In other words, we need to exert every effort to transport customers efficiently while using less energy.

Fig. 2-3 shows ANA's record of CO2 emissions per available-seat-km (ASK). Fig. 2-4 shows the ANA Group's record of CO2 emissions per available seat-km (ASK). As shown, after 1990, CO2 emissions per unit seat-km have tended to decrease, despite the significant increase in the number of available seats as the demand for air transportation grows. After 2000, both ASK and fuel consumption rates dropped, suffering from the effects of recession, terrorist attacks in the US, the Iraq War, and SARS (Severe Acute Respiratory Syndrome).

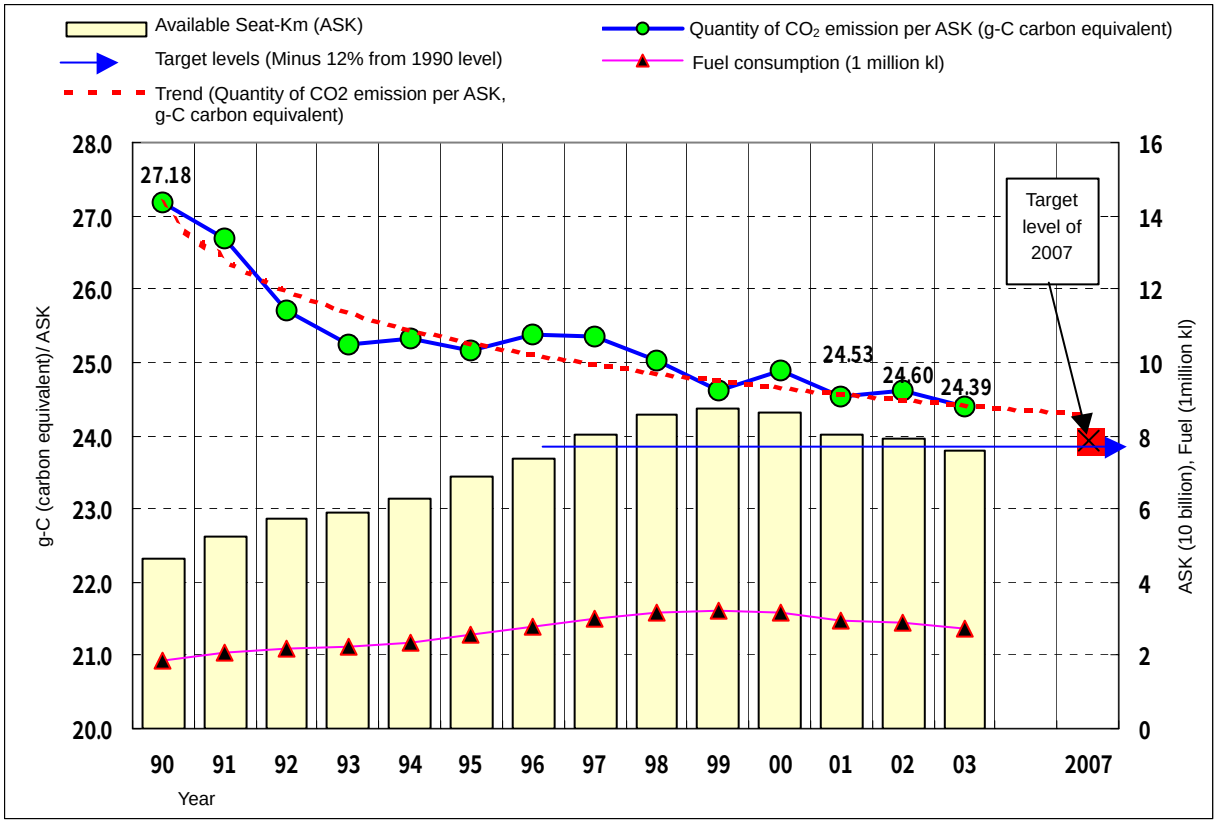


Fig. 2-3 ANA's CO_2 emissions per available seat-km (ASK). (Excluding the data for cargo fleet)

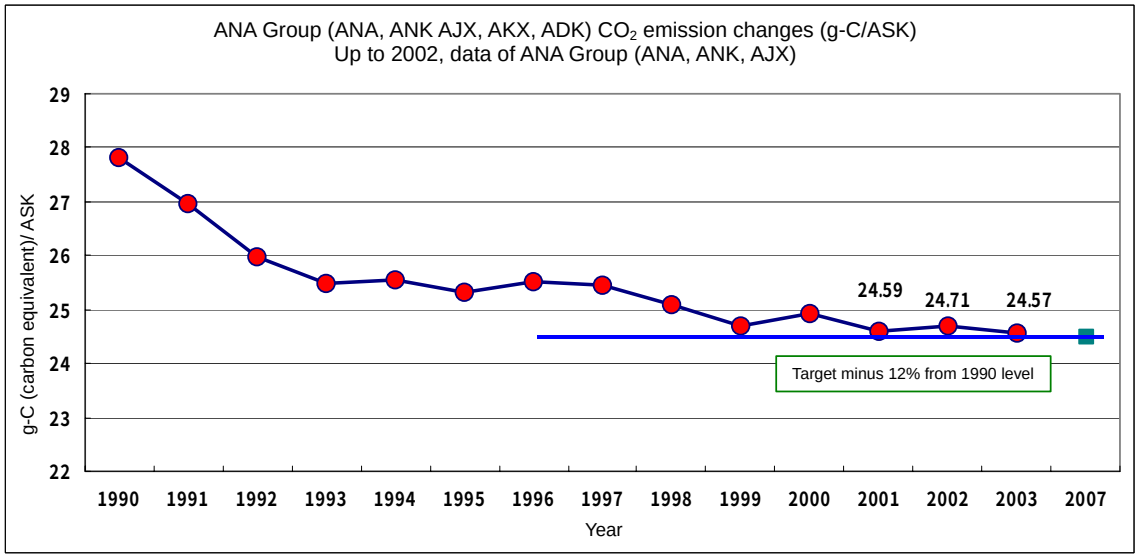


Fig. 2-4 CO_2 emissions of ANA Group per available seat-km (ASK) (Excluding the data for cargo fleets)

(2) History of introduction of fuel efficient aircrafts

To reduce CO2 emissions, or in other words to reduce fuel consumption, there are three effective methods: 1. Introduce efficient engines which utilize the most advanced engine technology. 2. Reduce air resistance through such means as improved wing forms. 3. Reduce body weight through the use of composite materials. Fig. 2-5 and 2-6 show how the introduction of new aircraft has improved fuel efficiency and reduced our CO2 emissions. Types of aircraft are shown in order of year of introduction from left to right.

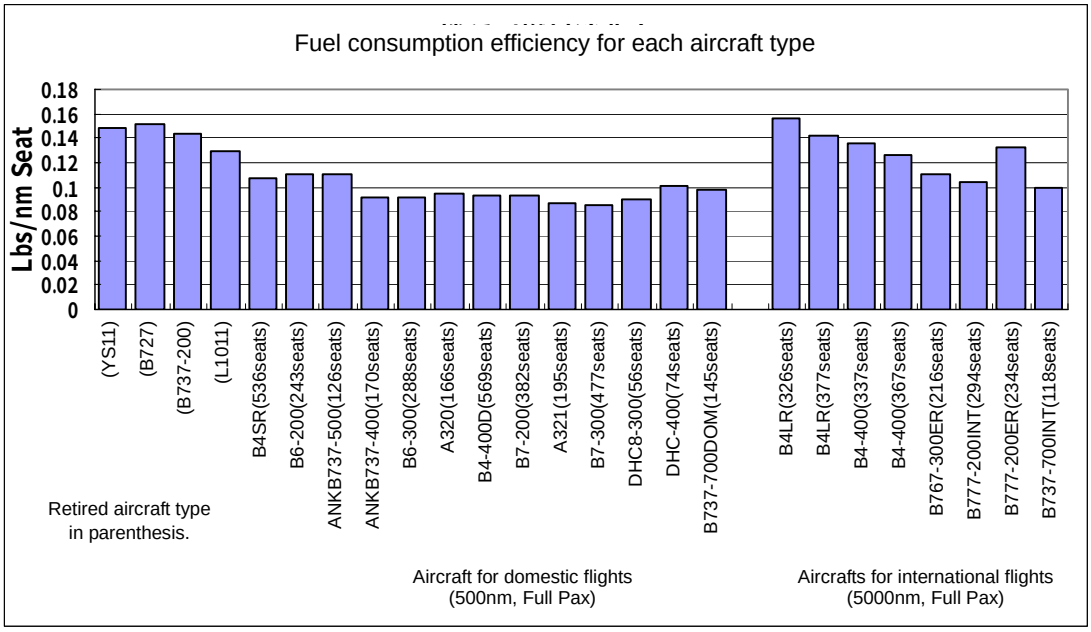


Fig. 2-5 Fuel consumption efficiency for each aircraft type

As its latest aircraft, ANA Group will start introducing the new generation B737-700 and NCA will introduce the B747-400F (Cargo fleet) in 2005.

In July 2004, ANA was the first company to order 50 of the latest B7E7 aircraft. We expect that the B7E7, which is equipped with the most advanced engines utilizing the latest technological innovations, will greatly improve fuel consumption. (Projecting about 20% improvements in long distance flights)

The advanced engine technology is able to reduce other emissions as well. It is the next generation aircraft (the *Dream Liner*) which will be able to reduce much of the greenhouse gas in 21 century. ANA will introduce the B7E7 aircraft beginning from 2008.

The table below shows the introduction year and the retirement year for each aircraft in the ANA and NCA fleets.

Aircraft type	The year of introduction	The year of retirement (planed)
YS-11	1965	August, 2003 (ANK)
B727-200	1969	1990
B737-200	1969	2000
L1011	1974	1995
DHC-6-300 (ADK)	1974	-
B747SR	1979	Expected to be retired - March, 2006.
B767-200	1983	Expected to be retired - March, 2004.
B747F (NCA)	1984	-
B747LR	1986	Expected to be retired - December, 2005.
B767-300	1987	-
B747-400	1990	-
A320	1991	Subsequently expected to be retired after 2005
B737-500 (ANK)	1995	Subsequently expected to be retired after 2007
B777-200	1996	-
B777-300	1997	-
A321	1998	Expected to be retired in the end of 2007
B737-400 (ANK)	2000	Subsequently expected to be retired after 2005
DHC-8-300 (AKX)	2001	-
DHC-8-400 (AKX)	2003	-
B777-200ER	2003	-
B747-400F (NCA)	2005	-
B737-700 (ANK)	2005	-
B7E7	2008	-

Table 2-1
the introduction year and retirement year for each aircraft of ANA Group and NCA

Fig.2-6
Comparison of CO2 emission per seat between Tokyo and Sapporo

(3) Fuel saving measures

From the first Oil Crisis in 1973 to the second Oil Crisis in 1979, ANA examined every fuel saving measure possible and has implemented many such measures. Reference 2, at the end of the chapter, shows the major fuel saving measures that ANA is currently implementing.

(4) *Efficient Fuel Program (EFP)* promotion project

ANA has started the *Efficient Fuel Program (EFP)* project in August 2003. This project is designed to increase fuel consumption efficiency related to flight operations by undertaking additional measures. Such measures include taking into account the weather condition and air traffic control information when determining aircraft's altitude and speed for flight plans, and informing pilots about landing approach information at specific airports. We calculate the amount of fuel saved through these measures monthly, and the total number for the 8 months in 2003 was 20,400 kiloliters. This equals to the amount of fuel required by a B777-200 aircraft to make 1457 round trips between Tokyo and Itami.

(5) Taxi operation while stopping one or two engine after landing

To save fuel, since 1994.ANA aircraft follow a procedure by which the pilots may shut down one of the engines if they are not required for aircraft operation while taxing on the runway. (Aircraft with 4 engines may stop 2 engines.)

The decision on whether or not to stop the engines is made by pilots who assess all kind of conditions such as airport and climate condition, landing circumstances, aircraft condition and air traffic control instructions. If we create a model to calculate the amount of fuel saved by this procedure, while making a number of assumptions, at HND, NRT, KIX, ITM, OKA, CTS, FUK, SDJ airports, all of which have long taxing distance, we save 1,821 kiloliter of fuel annually. The assumptions in this model were as follows: the average time that an engine is not operating was 3 minutes, and the crew chose to turn of any number of engines while taxing 50% of the time.

The amount of fuel saved equals to the fuel required by a B777-200 to make 130 round trips between Tokyo and Itami.

(6) Maintain engine performance by washing the engine compressor

As engine is used, tiny dusts particles stick to the engine compressor and adversely affect the fuel consumption. To improve fuel consumption, in April 2003, ANA started to wash the B777 engine compressors to remove all the dust in order to maintain high engine performance. As a result, we calculated that the fuel consumption of the B777 aircraft fell by 3,100 kiloliters annually. The total fuel quantity saved is equal to the amount of fuel that a B777 would need to make 221 round trips between Tokyo and Itami.

Starting from 2004, we plan to apply this procedure to A321, B767-300 and B747-400 in order to save even more fuel.

This picture shows a trial of an engine wash procedure for the A320 aircraft. Special equipment is employed in the engine wash procedure for the B777.

(7) Preferential use of Ground Power Unit (GPU)

As environmental measure, ANA management has been encouraging flight attendants and other business associates to reduce the usage of the Auxiliary Power Unit (APU) since 1990. APU is a small on-board auxiliary power unit, which provides electricity to the aircraft as well as provides high-pressure gas for starting the main engines and maintaining

the air conditioning on-board. APU is controlled by a switch in the cockpit and it is very easy to use. However, the APU requires fuel to operate while the Ground Power Unit (GPU) requires electricity provided by the local power company and therefore more energy efficient. In order to save fuel, ANA promotes priority use of the GPU over APU for the operation of the air-conditioner unit and other systems requiring electrical power. For instance, we utilize as much electricity produced by the GPU instead of the APU while preparing for departure, until the main engines are turned on. Even though using the GPU is more complicated for our crews, we still promote its use in order to decrease our fuel consumption. We also promote the similar usage of the GPU among our business associates.

Message from AGP Corp. (Airport Ground Power Supply Corporation)

Our company provides ground power unit service to parked aircraft for electric power and air-conditioning at the airports of Haneda, Narita, Osaka, Kansai, Chitose, Fukuoka, Okinawa and Hiroshima, enabling aircraft to operate on the ground without using their APU. Through the use of our services, ANA has reduced CO2 emissions of 80,000 tons in CO2 equivalent per year (which is equivalent to 30,000 kl jet fuel or 1050 round trips between Tokyo and Sapporo (Chitose)) by a B747-400. With closer coordination between crews and maintenance workers, ANA has higher GPU usage rate than other airlines, demonstrating their efforts in global warming measures.

(8) RNAV (Area Navigation) implementation

From June 2003, the *RNAV (Area Navigation)* procedure was formally implemented. RNAV is the navigation method for flying in the set flight paths where one's location is determined by the ground radio-guidance facilities, inertial navigation system, and Global Positioning System (GPS). In Japan, RNAV tracking paths were established 10 years ago, and now close to 40 such tracking paths, centered on major flight routes, exist. The RNAV tracking paths are more direct than the conventional ones which had to zigzag to connect to radio guidance facilities.

As a result, it has become possible to operate much shorter flights which contribute to both the fiscal bottom line, by reducing fuel consumption and environmental protection by reducing gas emission from engine exhaust. Figure 2-7 shows an image of a direct route. RNAV tracking paths allow for more direct routes between destinations. In addition, RNAV is used in determining approaches around airports, which is effective for noise reduction measures since it becomes possible to avoid flying over populated areas.

ANA is heavily involved in promoting the implementation RNAV both inside and outside Japan.

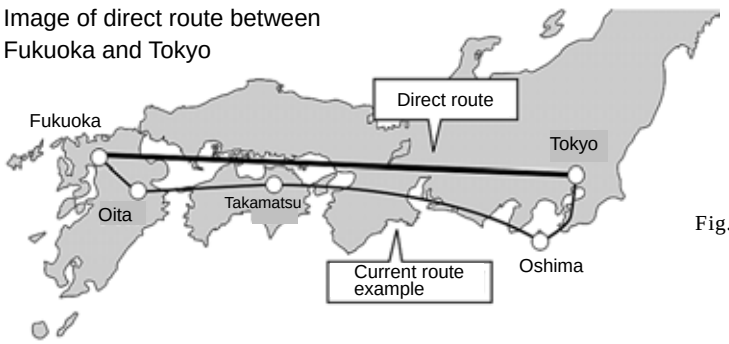


Fig. 2-7 Image of direct route

(9) Flight simulator usage to decrease fuel consumption

For many years, ANA used a flight simulator to train flight crews and ground attendants which lead to a decrease in the overall fuel consumption (reduction in CO2 emission), and noise reduction. In addition due to the limitation of training airspace, the use of flight simulator allows for better training of our personnel. In 1971, the regulating authority authorized the use of flight simulator for the YS-11A instead of the actual flight training. Due to this authorization, ANA could finally meet its goals of improving equipment performance and training/evaluation of our crews. Currently, almost all of the flights and examinations take place in the flight simulation system. The flight simulator is also used for training and examinations of the aircraft mechanics.

We estimated the fuel saving that resulted from training and examining mechanics and attendants in 2003. The number of hours spent in the simulators was 43,863, and when we compare the amount of fuel that would be required by a real aircraft to the amount of required simulator electricity, we estimate that we saved 310,000 kiloliter of fuel annually. That is 11% of the fuel consumption for all ANA flights last year. We will keep working on expanding the simulator operation.

3. Energy saving measure other than jet fuel

Energy consumption of the whole group's ground operations, such as ground utility and vehicles, was approximately equal to 49,216 kiloliters of oil. That is approximately 2% of the whole group's energy consumption, which includes aviation fuel consumption.

The detail of energy consumptions is as follows: 75% for electricity, 13% for vehicles, and the rest for the heating cost (oil/gas) at the company's facilities. The largest source of energy consumption was electric power, at 137,800,000 KWH. That is equivalent to 36,518 kiloliters of oil. This number shows an increase of 1.7% over the previous year, largely due to the fact that we are keeping track of energy consumption at a larger number of facilities. However, the total power consumption company wide was 1,270,010,000 KWH which is 93.7% of the energy used in the previous year, which translates to the savings of 10,790,000 KWH. As result, we saved approximately 100 million Japanese yen over the last year.

Main factors that contributed to the energy savings:

1. Adjust the settings on the air conditioning system, reduce the number of operating air conditioners and reduce the excess lighting at many business locations. We could achieve definite improvements at our business center, training center for attendants and aircraft maintenance factory, the three locations that used the majority of the consumed power.
2. Switching computer systems to the internal power supply resulted in reduced electricity usage at each business location.

Quantity of reduced power consumption (over fiscal year of 2002)	
Business center	△4,700,000KWH
Aircraft maintenance Haneda factory	△2,400,000KWH
Training center for attendants	△1,700,000KWH
Switching computer system's power source	△ 8,000,000KWH (estimated)

Refer to “Environmental Data Book” at the end of this report for year-to-year variability.

Reference 1

Summary of IPCC Special Report

1. In response to a request by the ICAO, IPCC assesses the effects of aircraft on climate and atmospheric ozone, both in the past and in the future (2050).
2. Global passenger air travel, as measured in RPK, is projected to grow by 3.1 to 4.7% per year in average between 1990 and 2050, whereas total aviation fuel use (CO2 emissions) is projected to increase by 1.7 to 3.8% per year.
3. The range of increase in total aviation carbon dioxide emission to 2050 would be 2.6 to 11 times the value in 1992.
4. Emissions of carbon dioxide by aircraft were about 2% of anthropogenic carbon dioxide emissions in 1992 and will be 3% of the projected total anthropogenic Carbon dioxide emissions in 2050.The best estimate of the radioactive forcing, The perturbation to the energy balance of the earth-atmosphere system, in 1992 by aircraft is about 3.5% of the total radioactive forcing by all anthropogenic activities. Radioactive forcing by aircraft in 2050 will be about 5% of the radioactive forcing by all anthropogenic activities. (The effects of possible changes in cirrus clouds is not included)
5. Over the period from 1992 to 2050, the overall radioactive forcing by aircraft (excluding that from cirrus clouds) is a factor of 2 to 4 larger than the forcing by aircraft carbon dioxide alone. The overall radioactive forcing for the sum of all human activities is estimated to be at most a factor of 1.5 larger than that of carbon dioxide alone.
6. CO2: The range of increase in aviation emissions to 2050 would be 1.6 to 10 times the value in 1992.
7. NOx: The NOx emissions from subsonic aircraft in 1992 are estimated to have increased ozone (O3) concentrations at cruise altitudes in northern mid-latitudes. Aircraft NOx emissions are expected to decrease the concentration of Methane (CH4) that are global in extent. Global average radioactive forcing are of similar magnitude and opposite in sign, but the net regional radioactive effects are not cancelled.
8. Water vapor (H2O): Water vapor is a greenhouse gas. For subsonic aircraft this effect is smaller than those of other aircraft emissions such as carbon dioxide and NOx. For high speed civil transport (HSCT) aircraft, although there is considerable uncertainty, additional radioactive forcing due to accumulation of stratospheric water vapor is estimated as supersonic aircraft consume more than twice the fuel per passenger-km.
9. Contrails: Contrails are triggered from the water vapor emitted by aircraft and their optical properties depend on the particles emitted or formed in the aircraft plume and on the ambient atmospheric conditions. Contrails tend to warm the Earth's surface, similar to thin high clouds. In 1992, aircraft line-shaped contrails are estimated to cover about 0.1% of the Earth's surface on an annually averaged basis with larger regional values. The contrail cover is projected to grow to 0.5% by 2050. The radioactive effect of contrails is similar to that of CO2 and O3, but still uncertain.
10. Cirrus Clouds: Extensive cirrus clouds have been observed to develop after the formation of persistent contrails. The mechanisms associated with increases in cirrus cover are not well understood and need further investigation. An increase in cirrus cloud cover tends to warm the Earth's surface.
11. Sulfate (SOx) and Soot Aerosols: The aerosol mass concentrations in 1992 resulting from aircraft are small relative to those caused by surface sources. Increase in soot tends to warm while increases in sulfate tend to cool the Earth's surface. The direct radioactive forcing is small compared to those of other aircraft emissions.
12. Impacts of Supersonic Aviation: Supersonic aircraft consume more than twice the fuel per passenger-km compared to subsonic aircraft. The radioactive forcing of civil supersonic aircraft is estimated to be about a factor of 5 larger than that of the displaced subsonic aircraft. The addition of a fleet of civil supersonic aircraft is assumed to begin operation in the year of 2015 and grow to a maximum of 1,000 air craft by the year of 2040, which is projected to add a further 40% Increase of radioactive forcing. Most of this additional forcing is due to Accumulation of stratospheric water vapor.
13. Aircraft and Engine Technology Options: A 40 to 50% improvement in fuel efficiency is projected by 2050. The typical aircraft and engine life expectancy, 25 to 35 years, have to be taken into account when assessing the Improvement rate. (Substantial aircraft and engine technology advances are already incorporated the aircraft emissions scenarios used for climate change calculations)
14. Operational Options: Improvement in air traffic management (ATM) and other operational procedures could reduce aviation fuel burn by between 8 and 18% (The Air traffic management improvements are already incorporated in the aircraft emissions scenarios used for climate change calculations). The large majority (6 to 12%) of these reductions comes from ATM improvements which it is anticipated will be fully implemented in the next 20 years. Operational Options: Improvement in air traffic management (ATM) and other operational procedures could reduce aviation fuel burn by between 8 and 18% (The Air traffic management improvements are already incorporated in the aircraft emissions scenarios used for climate change calculations). The large majority (6 to 12%) of these reductions comes from ATM improvements which it is anticipated will be fully implemented in the next 20 years.
15. Regulatory, Economic, and Other Options: Policy options to reduce emissions further include more stringent regulations, environmental levies (charges and taxes), emission trading, modal shift (substitution of aviation by rail and coach) and so on. Some of these approaches have not been fully investigated or tested in aviation and their outcomes are uncertain.

Reference 2

Fuel Saving Measures

No	Fuel saving measure item	Contents
1	Suitable approach and departure method for Kagoshima airport	Improvement of departure and approach method : To revise Standard Instrument Departure (SID) method and Standard Arrival Route (STAR), and to shorten the route in order to reduce the fuel consumption.
2	Profile descent to New Chitose airport RWY01	
3	Selection of suitable approach method and shortening radar inducement route in Kumamoto airport	
4	Improvement of radar inducement route in Fukuoka airport	
5	Change of Matsuyama airport departure route	
6	Passing through the test and training area of the Air Self Defense Forces	To shorten the route distance by passing the area on weekends (Saturdays, Sundays, and National holidays) in which the ASDF does not train.
7	Selected the best cruise speed	To save the fuel by optimizing the cruise speed.
8	Selected the cruise altitude	As the altitude is raised, fuel efficiency improves at 1% per 1000feet.
9	Delayed Flap Approach	To delay the use of landing flap, which creates a lot of air resistance, when approaching the airport in order to reduce the fuel consumption.
10	Use of low flap angle	To use a low flap angle that decreases the air resistance in order to save fuel.
11	The best bleed air management (Reduced Pack Flow Operation)	Air for the air conditioner is taken from the engines directly; therefore, by carefully controlling the airflow from the engine, we can optimize the engine performance to increase fuel efficiency.
12	Unnecessary engines are shut down when taxiing	Stopping unnecessary engine use after the landing to taxi in.
13	Engine start during push back	The aircraft used to be pushed back to the taxiway after all engines are started but from now on the engines will be started during push back.
14	Standardization of Max. Climb Thrust(MCLT) use	To stop the use of delayed thrust, and to use the thrust more efficiently to reach higher altitude sooner to increase the fuel efficiency.
15	The best effect approach	An effective approach by the idling pass planning leads the fuel saving.
16	Optimization of the loading fuel process	Reviewing and improving the fuel loading standard leads the higher fuel efficiency.
17	Further reducing the Auxiliary Power Unit (APU) operation	Using a Ground Power Unit (GPU) instead of an APU to power the air conditioner as much as possible before the departure and after the landing will save fuel.
18	Using a flight simulator for flight crew and mechanic trainings	Using the flight simulator for the flight trainings, the co-pilot periodical check and aircraft tests. The training of ground crews for engine operations is done with Ground Simulator instead of actual engine.
19	Removal of Brake Cooling Fan and drinking water cooler, reduction in the amount of drinking water and other weight reduction measures	Parts of a brake cooling fan and water cooler are removed to reduce weight after their use was deemed unnecessary. Reduction in the amount of drinking water carried on each flight. Switch to lighter products: meal trays, meal carts, seat cushions, passenger seats, carpets, LCD flat screens, basinets, oven racks, and life jackets; change the cloth towels to the paper towels and switch to lighter plastic cups. Reduce the number of the following items loaded: blankets, utensils, wet towels, etc. by loading just enough at each departure point. Also, reduce the number of cockpit manuals and spare copies of the in-flight magazine Wingspan.
20	Introduction of FMS/R-Navigation methods on domestic routes Enroute (Airport terminal area)	Reduction of domestic and international flight path distances due to R-Nav route setting after 1990. R-Nav operations introduction around airports, first in domestic and then in other countries, after 1997 to reduce flight distance and time.
21	Reduced Vertical Separation Minimum (RVSM) operation on international flights	ANA adopted a vertical separation of aircraft by 2000ft instead of 4000ft in 2000 on the north pacific routes. From 2002, ANA applied this procedure to all flights to Europe, Southeast Asia and Canada (after 2005 in Japan and US). As a result ANA can save several hundred pounds of fuel per flight.
22	Revised Fuel quantity onboard in international flight plans (New Contengency Fuel)	New Contengency Fuel Method(load 5%fuel instead of 8.5% of burning) changed from Re-clear started 2002, and save 2 to 3 thousand Lbs fuel at NRT-EU flight.
23	Reduction of flight route distance at the Kansai to Haneda Route	Flight route via the Suzuka mountains was changed in 2001 and saved 6 minutes and 2000Lbs(B747-400) of fuel per flight.
24	Actual practice of VNAV-Approach Procedure(continuous descending procedure)	The procedure is to maintain higher altitude until airport vicinity, and apply continuous descent from higher altitude to reduce noise and save energy. ANA started the implementation of this procedure at the New Chitose airport runway 19 using B777, and B767. Currently we are investigating whether or not to extend this procedure at the New Chitose airport runway 19 using B747-400 and at the Hiroshima airport runway 28 using A320/321, in addition we may consider extending this procedure to other aircraft in the future.

Chapter 3 Air Pollution

<ANA's commitment and achievements>

In regards to the designated fluorocarbon solution (one of the ozone depleting substances), by retiring the ANK YS-11 aircraft in august 2003, we no longer use that substance. In regards halon in the fire extinguishers, we introduced the recycling system that by 2004 will check and dispose of such fire extinguishers at our maintenance facility. We are aiming for zero emission.

1. Connection with air pollution

ANA's activities connected to air pollution include mainly

(1) exhaust from aircraft and

(2) exhaust from ground vehicles.

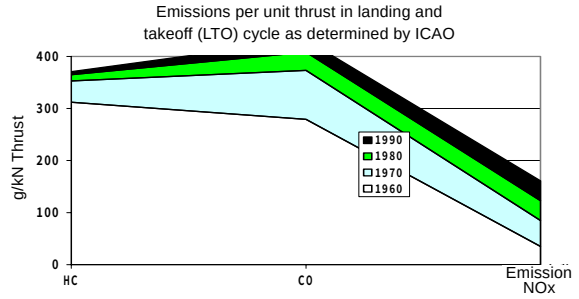


Fig. 3-1

(1) Reduction of exhaust from aircraft

1) Use of aircraft with fewer emissions

As the most effective method to reduce hazardous material emissions from aircraft, ANA has actively introduced new aircraft equipped with new and improved engines. Fig. 3-1 shows data of significant emissions reductions over the past 30 years by IATA. As shown in this figure, HC and CO emissions have been reduced considerably over the past 30 years, but NOx has not been reduced to as great an extent. This is because pressure and temperatures in combustion chambers have been raised in order to improve the combustion efficiency of jet engines.

Fig. 3-2 on the next page shows a comparison of emissions between the fleet of ANA group and the ICAO standards and the fleet of NCA and the ICAO standards. Engines currently in service at ANA cleared ICAO standards, except for a small number of small-scale production engines, which will be retired by fiscal year 2006.

2) Improvements in operations

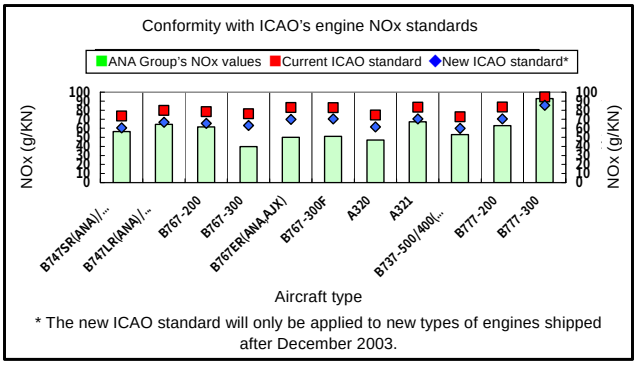
As measures to control emissions in operations, ANA has implemented various approaches including the decreasing auxiliary power unit (APU), shortening engine test runs on the ground, and reducing actual flight training and ground test flying through the use of simulators. These approaches are same approaches with fuel reduction of global warming measures which are described in the 2 section of chapter 2.

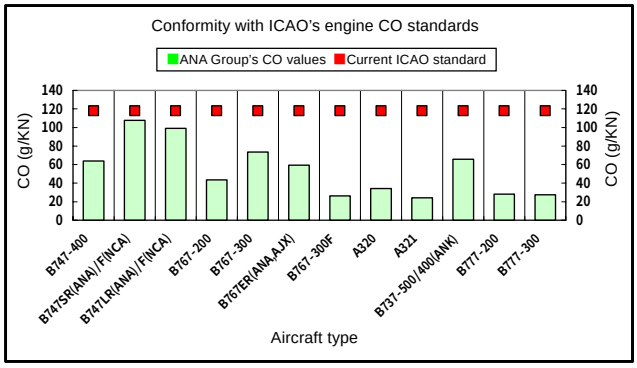
(2) Promotion of Exhaust Reduction Measures (NOx and SPM) for Airport Ground Vehicles

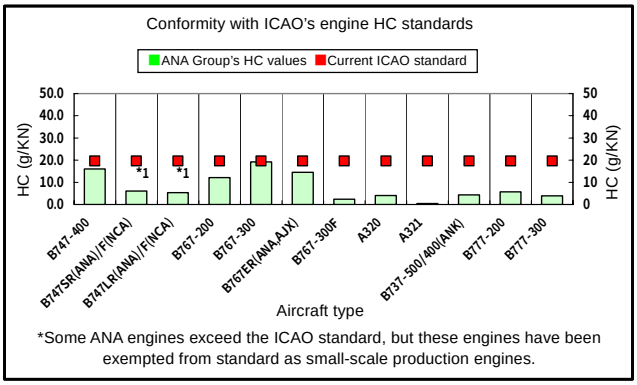
The ANA Group uses 2252 automobiles of various types (ground service equipment vehicles: airport handling cars, towing cars, power unit cars, maintenance crew vehicles, forklifts, etc.) in domestic airports in Japan, and has made efforts to introduce lower pollution cars or to update our automobile fleet with the latest vehicles with fewer hazardous emissions. As of March 2004, we have a total of 130 low pollution vehicles (6% of all ground vehicles), including low-emission cars, electric (battery operated) cars, natural gas cars, and hybrid cars. For driving, ANA also emphasizes the need to stop vehicle idling.

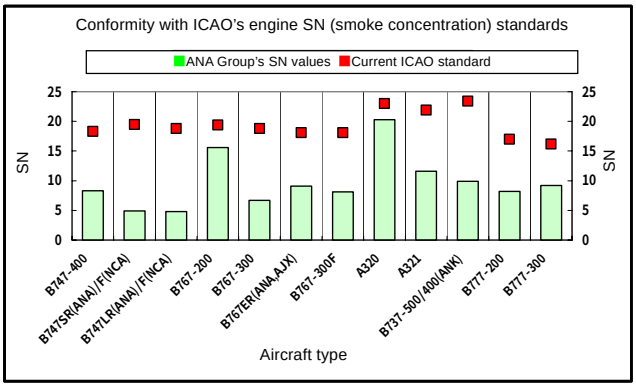
Picture: Example of low pollution vehicles at Osaka Airport Motor Services (OAMS). A hybrid car on the right and a battery operated towing car on the left.

Figure 3-2 a comparison of emissions between ANA and NCA fleets' engines and ICAO standards









Conformity with ICAO

Fig. 3-2 shows a comparison of emissions between ANA fleets' engines and ICAO standards. Engines currently in service at ANA cleared ICAO standards, except for a small number of small-scale production engines, which will be retired by fiscal year 2006. ICAO aims to further reinforce NOx emissions standards by 2006, and plans "to strengthen the new standards currently on schedule by 12% for new types of engines to be approved after 2008."

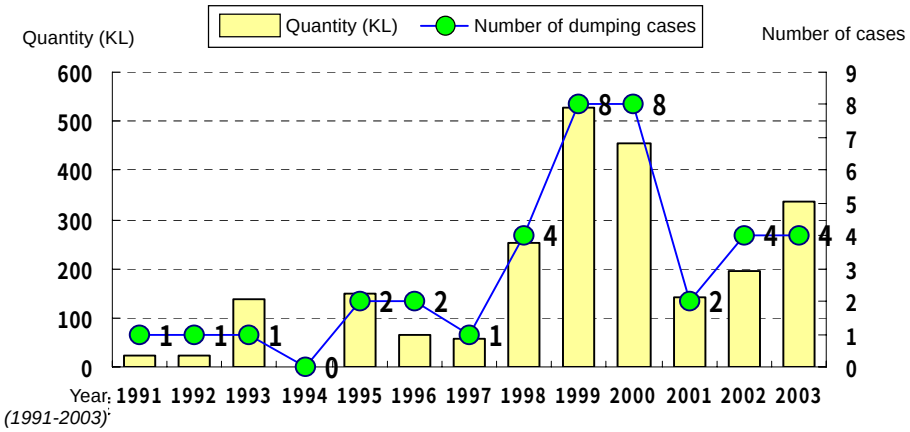
Engine emissions during ICAO's LTO cycle for fiscal 2003 (Unit:ton)

	ANA	ANA Group (Incl. ANK, AJX and NCA)
NOx (nitrogen oxide)	55,000	66,000
HC (hydrocarbons)	10,000	11,000
CO (carbon monoxide)	54,000	63,000

(3) Others

Fuel dumping in cases of unexpected landing. It was necessary for ANA fleet to dump fuel four cases in fiscal year 2003, resulting in approximately 335 kiloliters of fuel dumped.

Figure 3-3 Year-to-year changes of fuel dumping cases and dumped fuel quantity



Fuel dumping is:

If an airplane needs to make an unexpected landing due to any mechanical malfunction or passengers needing immediate medical care, the aircraft inevitably needs to dump fuel to reduce its weight in order to ensure a safe landing.

Different airports designate specific dumping locations and altitudes, such as over oceans, to avoid fuel dumping over any urban areas. If dumped at higher altitudes, fuel becomes a diffuse mist; therefore, it will not directly affect those on the ground below.

2. Aircrafts Improvements and Air Pollution

There has been significant progress in research and development of technologies to reduce emissions from aircraft engines with outstanding achievement in the past 30 years, especially in emissions reduction of HC (hydrocarbons), CO (carbon monoxide), and soot.

Fig. 3-1 shows the 10-year record from 1980 to 1990 on emissions per thrust unit in the Landing/Takeoff Cycle (LTO) as determined by ICAO and this is provided by IATA. As shown here, HC and CO emissions have been reduced considerably in the past 30 years, but NOx (nitrogen oxide) emissions have not. This is because temperatures and pressures in the combustion chambers were raised to improve the combustion efficiency of engines, which has made it difficult to reduce NOx emissions.

Moreover, to reduce NOx production requires the increase of CO2 exhaust, thereby creating the question of how to balance this tradeoff. To reduce NOx emissions, various measures have been studied and some already have been applied. These measures include: multi-combustion chambers, pre-mix and sparse combustion system, excess concentration-rapid cooling- and sparse combustion system, pre-mix catalytic combustion system, etc. Regarding the emissions of sulfur oxides (SOx), the emission quantity depends on the type of fuel used. Current jet fuel (kerosene type) has the sulfur content of 0.01% or less (specification is 0.3% or less), so its effect on air pollution (especially regarding acid rain) is minimal.

3. Connection to Ozone Layer Depletion

Ozone depleting substances include fluorocarbons, hydrofluorocarbons, methyl chloroform, tri-chloro-ethane, and carbon tetrachloride. Also nitrogen oxides (NOx) emitted from aircraft are said to increase ozone in the troposphere. Other than nitrogen oxides emitted from aircraft, ozone depleting substances ANA uses include: 1.Those included in the equipment of aircraft itself. 2. Those used during aircraft maintenance,
3. Those used in maintenance vehicles 4.Those used in the buildings ANA uses.
For these, ANA promotes the use of alternatives and improvements on the handling of ozone-depleting substances as follows:

(1) Those included in the aircraft equipment itself

Aircraft equipment that uses fluorocarbons and halons:

1) The gas cylinder for rain repellent

Propellant used in the gas cylinder for rain repellent (drip-proof agent propelled to the front glass of the aircraft in rain) was a designated fluorocarbon solution (CFC113). After it was proved (by Japanese authorities and the US Federal Aviation Agency, except in the case of YS-11 turbo-prop airliner) that the removal of such a system would not cause any aircraft safety problems, ANA disabled the system, and completed this in fiscal year 1998 (YS-11 of the ANK fleet was gradually changed over to the newer DHC-8-300/-400, and all YS-11 planes were retired by August 2003).

2) Air chillers (cabin refrigerators to store food items)

ANA completed its change of refrigerant types from designated fluorocarbons (CFC12/CFC113) to an alternative (HFC134a), which is a non-regulated substance. At ANAÐcommissioned maintenance companies, these alternatives are recovered and recycled.

B747-400D, B777, and A320 have not used such refrigerants from the time of their introduction into the ANA fleet. Presently, ANA has developed ice-chilled carts and is using them in its cabins.

3) Water coolers

Water coolers were installed only in B747SR and B767-200 type aircraft at ANA. We have stopped using these water coolers and are in the process of removing them (removal completed for B747SR, and the entire fleet of B767-200 is scheduled to be retired in fiscal year 2003). At present, ANA uses mineral water only.

4) Fire extinguishers

Use of fire extinguishers in training exercises:
Passenger cabin crew is required to have fire drills at regular intervals to in preparation for potential cabin fires. For such fire drills, ANA changed its training method after February 1993, and began using dummy extinguishers or water extinguishers instead of halon extinguishers in its practice drills, while also utilizing visual training with video tapes. The dummy extinguishers are designed to have the same or nearly the same shape, weight, handling method, and duration of spouting extinguishing agents as halon extinguishers loaded in a cabin, and also have sufficient fire extinguishing capacity. Through these modifications we avoid the unnecessary release of halons into atmosphere.

Measures taken during the inspection and maintenance of fire extinguishers installed in aircraft: Halon fire extinguishers loaded on engines, cargo rooms and passenger cabins are inspected and maintained regularly by ANA-commissioned companies. By installing halon (1311) recovery equipment at ANA-commissioned maintenance companies, we have established a system for the effective use of halons. Through this measure, we are able to minimize halon gas leakage during maintenance to less than 2%. For Halon 1211, ANA plans to introduce similar equipment in near future.

(2) Those used during aircraft maintenance

Designated fluorocarbons and trichloroethane, which were used in aircraft maintenance, were eliminated in 1994, in accordance with the reduction plan prepared in 1990.

For designated fluorocarbons, ANA reduced their use through recycling and through the introduction and use of equipment that recovers cleaning solution, and then shifted to the use of alternative cleaning agents. The use of trichloroethane has been changed to an alkali cleaning solution.

(3) Measures for the refrigerant fluorocarbons used for the air-conditioning of motor vehicles

When vehicles are renewed or exchanged, ANA actively promotes the shift to vehicles that use alternative substances. All vehicle maintenance companies of the ANA Group (ANA Motor Services, Osaka Airport Motor Services, and Narita Engineering Services) are licensed to handle fluorocarbon recovery.

(4) Measures for halon fire extinguishers used in buildings

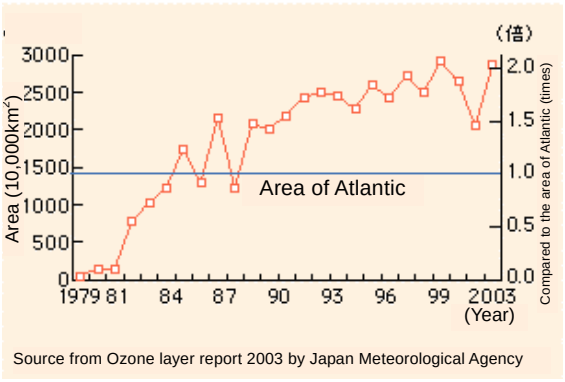
Halon fire extinguishers are installed in transformer rooms and computer rooms of ANA buildings. Recently, a new gas fire extinguishing agent has been developed, which can work as an alternative to halon fire extinguishers, and ANA is introducing them in newly-built buildings. In addition, we keep tight management over these extinguishers to avoid any unnecessary releases other than in an emergency.

Ozone Layer Depletion

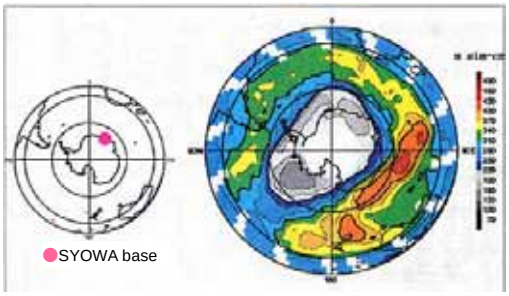
The ozone layer plays a role in protecting life on the earth by blocking much of the dangerous ultraviolet rays from the sun. In recent years, the ozone layer has been on the decrease globally, which, it is feared, would have a bad effect on human health. The decrease rate is especially high in high latitudes, and a statistically significant rate of decrease is also observed in Sapporo, Japan. The so-called ozone hole is observed over the Antarctic. (Fig.3-4 shows the transition of the ozone hole area observed over the Atlantic.) The substances contributing to the ozone layer depletion include fluorocarbon, halon, methylchloroform, trichloroethane, and carbon tetrachloride.

Fluorocarbon and halon are extremely stable materials; however, they diffuse to the stratosphere after being emitted to the troposphere, and produce chlorine atoms when decomposed by strong solar ultraviolet radiation. This one chlorine atom reacts with tens of thousands of ozone atoms, which depletes the valuable ozone layer.

図１－１－６　南極上空のオゾンホールの規模の推移



Source from Ozone layer report 2003 by Japan Meteorological Agency



Ozone-Hole (in blue color) 2003 Summer

Fig.3-4 Transition of ozone whole area over the Antarctic

Montreal Protocol

Substances that Deplete the Ozone Layer was adopted in 1987 out of the necessity to pro
ation has been strengthened by revising the protocol five times by 1999, based on new scie
as suspended at the end of 1993, and that of chlorofluorocarbon, trichloroethan, and carbo
of 1995. Production of CFC substitutes, too, will be mostly suspended by the end of 2019.
Layer Protection Law" and ratified the Montreal Protocol in 1989.

The United Nations Environment Program (UNEP) report describes the issues with the ozone layer as follows:

1. In the troposphere, the total quantity of Ozone layer depleting substances has been decreasing slowly after its peak during 1992 and 1994.
2. According to the stratosphere observation, the amount of chlorine is at its peak or is close to the peak. The amount of bromine is probably still increasing.
3. The *Montreal Protocol on Substances that Deplete the Ozone Layer* is active and it is expected that the ozone layer depletion by the substance, which are regulated in the protocol, will start to be solved within this decade. If all countries observe the protocol, it is expected that the ozone hole will be disappear by the middle of this century but the condition of the ozone layer is still weak even if the protocol is perfectly complied with.

Chapter 4 Noise

< ANA's commitment and achievements >
Through the aircraft noise reduction ecology plan, ANA is targeting by 2007 to have all aircrafts meet ICAO noise standards as described in Chapter 4. ANA is planning to retire current Chapter 3 Standard Aircrafts B747LR in Dec 2005 and B747SR in Mar 2006 to meet the targets.

1. Airport Noise

Followings are airport noise issues.

1) Aircraft noise (aircraft engine sound at landing and takeoff).
2) Ground Noise
    1. Engine ground running noise.
    2. APU (Auxiliary Power Unit) running noise.
    3. GPU (Ground Power Unit) running noise.
    4. Others (ground support equipment operating noise, maintenance facility operating noise and so on).

To reduce the influence of noise, the condition of the airport establishment becomes a big factor. As an airline company, ANA will continue to consider minimizing noise disturbance.

2. Aircraft Noise Standard

In ICAO Annex 16, the noise standard for sub-sonic jet aircrafts is defined. Presently, the standard is divided into two parts, Chapter 2 Standard and Chapter 3 Standard. In the ICAO assembly, the addition of a even stricter standard, Chapter 4 Standard (applicable to new aircraft models after 01 Jan 2006) was decided.

1) Chapter 2 Standard

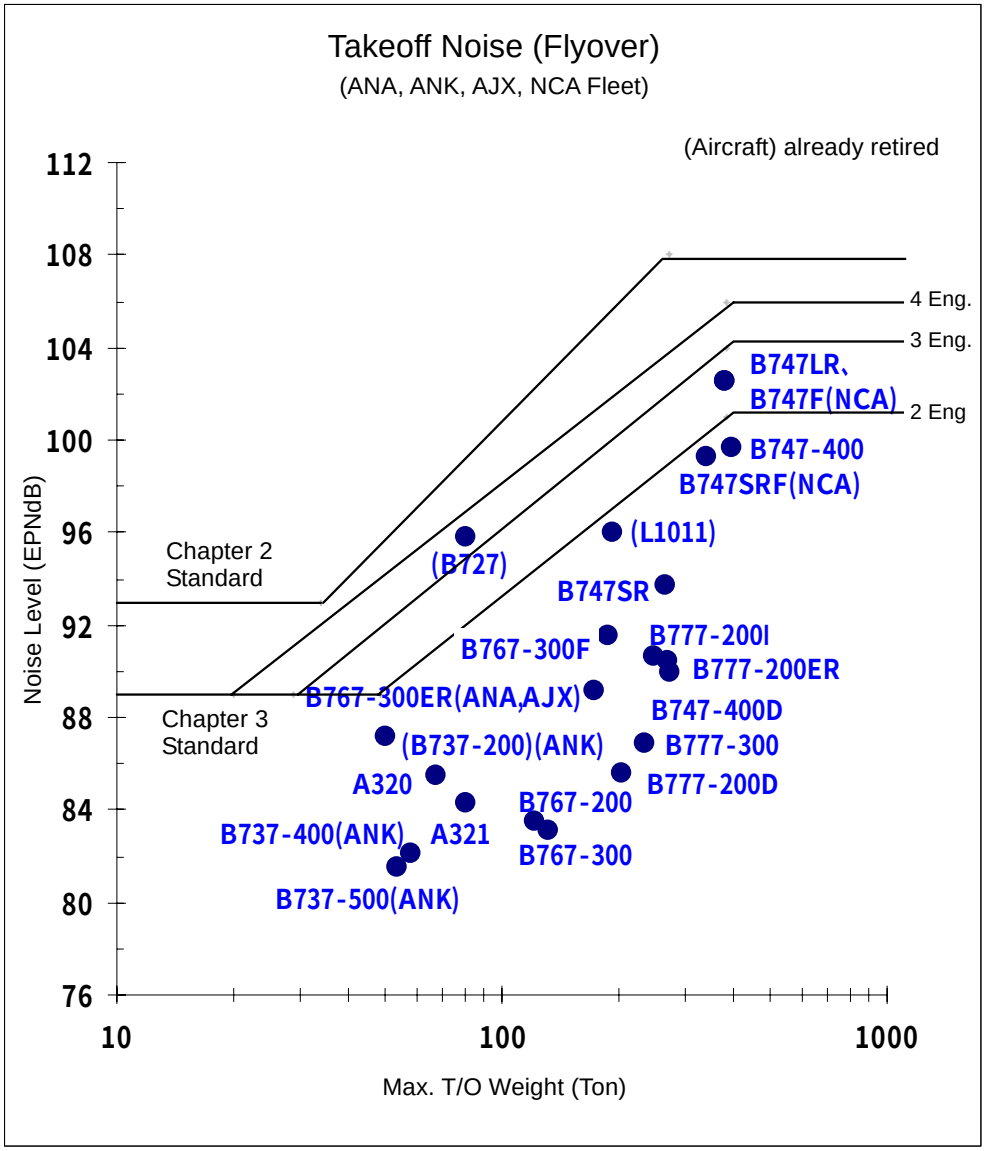
    This type of standard aircraft has been banned in major nations of the world since 01 Apr 2004. ANA Group has retired all its aircrafts of this type and holds no Chapter 2 standard aircraft.

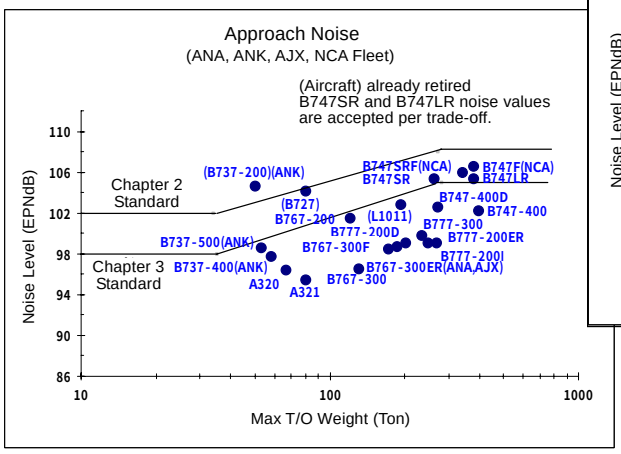
2) Chapter 3 Standard

    This is the strictest standard before the addition of the Chapter 4 Standard. All NCA aircrafts in the ANA Group's fleet have fully complied with Chapter 3 standards by 1994 (Refer to Fig 4-1). The contents of Chapter 3 Standard can be found at the end of this chapter in [Reference Materials 1].

3) Chapter 4 Standard

    In the Dec 2001 ICAO assembly, the addition of Chapter 4 Standards was decided. In Mar 2002 at the ICAO assembly, Annex 16 was revised and Chapter 4 standard was added. The new standard is applicable for new type certified aircraft after 01 Jan 2006. ICAO has not started certification of the current aircrafts. Although aircrafts other than ANA's B747SR/LR and NCA B747F are all planned to fully comply with Chapter 4 Standards (Refer to4-2). ANA is planning to retire all B747SR/LR by the end of 2006. With the introduction of the new B777-300 aircraft, NCA is planning to renew the current B747F to the next generation B747-400F. Details relating to the Chapter 4 Standard and the 33rd ICAO assembly can be found at the end of this Chapter in [Reference Material 2].





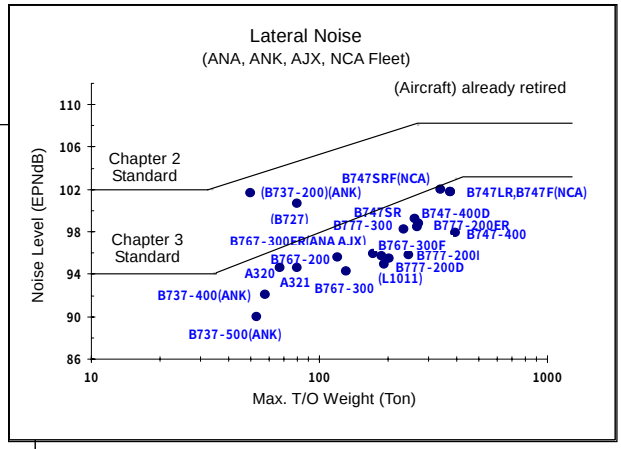


Fig 4-1 ANA Fleet Noise Levels and Standards (Compliance with Chapter 3 Standards)

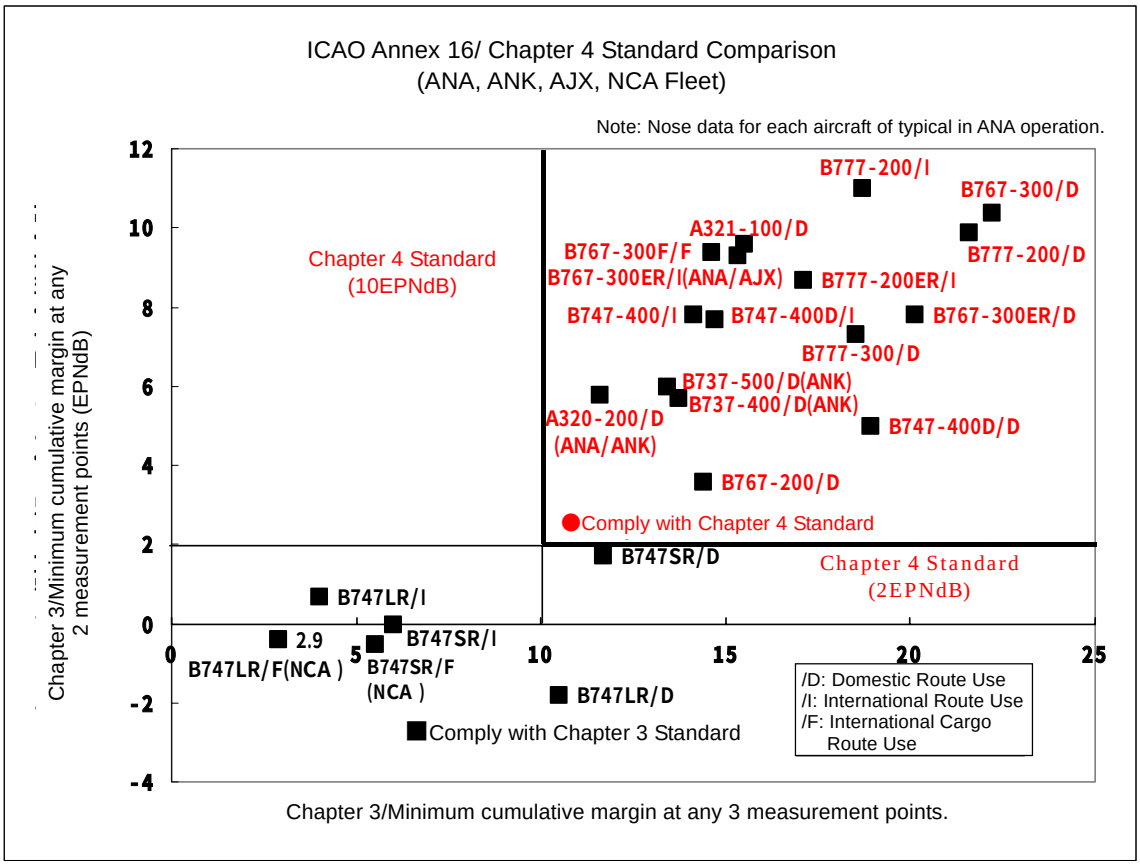


Fig 4-2 ANA Fleet Noise Level and Standards (Compliance with Chapter 4 Standards)

1. Noise Contour

The area influenced by the same noise level (noise contour) has been reduced with the introduction of new aircraft (Refer to Fig 4-3).

ANA has been participating in "Aircraft Noise Issue Sub-committee." It's a working group that is formed by the government and the people in combination, and is continuing review work to improve the accuracy of the noise-forecast program. Currently, the review is based on the Japanese Noise Assessment Unit, which is the Noise Peak Level (Maximum Value). But in order to conform to worldwide trends, the noise-forecast program is being revised to using energy-based units.

2. Noise Mitigation Measures

(1) World's Noise Mitigation Measures

In the ICAO 33rd Assembly, the recommendation for setting international standards that include halting the operation of current aircrafts have been abandoned due to significant economic effects. Although discussions are continuing for use as regional restrictions. According to each country's situation, 1) Noise source (mainly engine) noise reduction, 2) Planning and management of land nearby airports, 3) Reduced Noise Operating Methods, 4) Operating Restrictions will be considered and a balanced enforcement has been decided upon.

The [EU Mandate 2002/30/EC: Introduction of Restriction of Operations at Public Airports – Development of Regulations and Procedures] was released on 26 Mar 2002 in the EU. The document aims to realize the restriction of operation of aircrafts that clear Chapter 3 Standard by a small margin in each EU airport, but according to current information, ANA aircrafts have cleared all EU regulations.

Aircraft Noise Counter Footprint (Noise Contour Comparison)

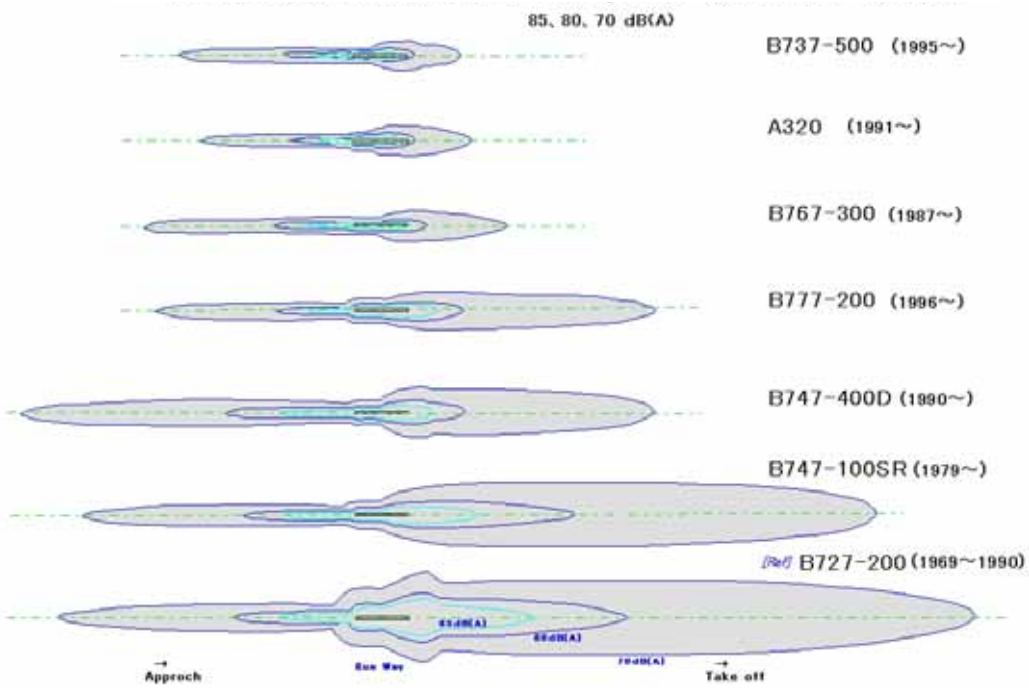


Figure 4-3 Noise Contour Comparison by Aircraft Type

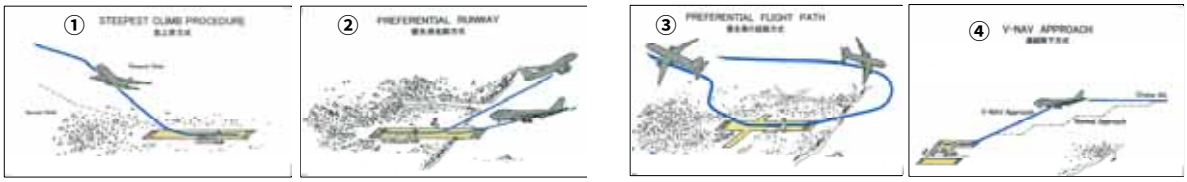
(2) ANA's Noise Mitigation Measures

①Introduction of Noise Abatement Operation Procedure

Based on the examination of "Promotion Committee of Noise Abatement Operational Procedure," which was established by the united efforts of the government and the people in 1975, ANA introduced Noise Abatement Operational Procedures at domestic airports and has been improving it up to the present.

Major Noise Abatement Operational Procedures Implemented by ANA

Method		Description	Airport Implemented
T/O	Steep Climb Procedure	Continue T/O climb until a higher than normal altitude (3,000 Ft). Make strong effort to keep high noise level within airport area and maintain altitude in residential areas to ensure reduction of noise. (Reference Fig 1)	Airports Nationwide
Landing	Delayed Flap Approach Procedure	Delay the lowering of flap and landing gear and by the reduction of engine thrusts, reduce noise.	Most Airports
	Low Flap Angle Landing Procedure	Set a reduced final angle of the flap during landing and by reducing drag, reduce the amount of engine thrust needed and reduce noise.	Airports with enough long runway length
T/O and Landing	Preferential Runway Procedure	When an end of the runway is not in a residential area, with wind direction and wind speed permitting use that end for landing and T/O. (Reference Fig 2)	Haneda, Matsuyama, Sendai, etc
	Preferential Flight Path Procedure	Around airports (low altitude), through circling and other methods to strongly avoid residential areas or fly above rivers. (Reference Fig 3)	Haneda, Narita, Itami, Nagoya, Sendai, etc
	V-NAV Approach	During decent, as much as possible maintain high altitude until close to airport. Then by descending continuously, avoid changes in engine thrust and reduce noise. There is also the effect of increased fuel efficiency. (Reference Fig 4)	Chisato
	FMS/LLZ Flying Procedure	Around the airport, utilize FMS/LLZ/RNAV. In conjunction, avoid residential areas while reducing the route length. During late night operation for Haneda,, instead of passing Kisarazu (land), take the over sea shortcut for T/O and landing.	Haneda, Frankfurt, Paris, Bangkok, etc



From 1999, FMS/LLZ Flying Procedures are used for late night flights. Also, in 2003, at the New Chitose Airport, the V-NAV Approach Procedure has been formally introduced. Further, discussion of expansion for other aircraft types and other bases is continuing.

②Kansai International Airport

Although shortly after the opening of the Kansai International Airport, for the Kansai → Haneda route, the sky above Kushimoto was used, in 1998, a new route was set. After adjustments with the local area, starting in 2003, a shorter flight path passing above Suzuka Mountains became possible. Flight time was reduced by approximately 6 minutes.

In Jun 2001, in order to minimize the impact on the environment of Osaka Bay and surrounding areas, the Kansai International Airport K.K. published the "Kansai International Airport Environment Management Plan (Eco-Island Plan)," with an aim to become an airport friendly to both people and environment. Similarly, a document (NOTAM) was published by the Narita Airport in 2003 that calls for the restraint of on the ground operation of APU.

③Osaka International Airport

Starting with the improvement on landing noise, and the introduction of low noise jet aircraft, the sharing of function with Kansai International Airport has been proven a success to reduce noise. This result has been determined by the Department of Transportation's Osaka International Airport Noise Abatement Area Re-evaluation project. In Apr 2000, after the reduction in size of the target area addressed by the Aircraft Noise Abatement law, the number of flights complying with the current nose abatement plan has been achieved. In Oct 2003 this was confirmed through actual measurement and the expect result was obtained.

④Tokyo International Airport (Haneda)

With the starting of operation of the new runway C in Mar 1997, the noise problem in the Haneda Airport area has further been eased. On top of this result, in Jul 1997, the airport became a 24 hour airport. In Mar 2000, the new runway B started operation, and for abatement of noise, the offshore relocation plan of A, B, C runways have been completed. ANA started in 2001 late night international charter flights and in Nov 2003 domestic late night cargo flights. Flight routes avoiding land are being used. Also, for commencing operation in 2009, the design of a new 2500m lateral wind use runway is being planned.

⑤Narita International Airport

Interim 2,180m parallel runway has been constructed at the end of Nov 2001 and started operation in Apr 2002. ANA group also with mid-sized aircraft for short distance international routes and domestic routes (ANA Connection) increased number of flights and started new flights.

5. Ground Noise

①Osaka International Airport

Along with setting sound isolating walls for the engine run-up were set up in 1971, effort has been put towards the reduction of test run-up time and high power operation time. A strong effort has also been put towards reducing APU operation time. During nighttime, low noise type generators and ground electricity sources are used as much as possible.

In order to reduce ground noise further, the government installed a new test operation area with a large-scale sound-isolating wall. Official operation was started in 2003. Because of this, ANA's sound wall installation was removed.

New Engine Test Operation Facility (White Facility: Back) and the former 30 year old sound isolating facilit (Red White Facility) removed in 2003.

②Narita International Airport

- With the start of operation of terminal 2, ANA takes into consideration the influence to residents near the taxiway and voluntarily refrains from operating the APU at the time of ramp-in and ramp-out. As for our operation of APU, APU OFF operation has been our standard since 1992, from the viewpoint of fuel cut down (reduction of CO_2 emission). The Public Corporation (Now Narita International Airport K.K.), from the viewpoint of global warming prevention, notified all airlines in the document (NOTAM) to "From Apr 1998, implement APU OFF operation as much as possible."

- The hanger type noise suppression facility (engine ground running noise) for the south wind was jointly constructed by ANA, JAL, and NAA in Apr 1999. Besides being more efficient and being able to handle all aircraft types as compared to the existing facilities for the north wind, 24-hour operation is possible. This contributes environmentally to the region.

③Tokyo International Airport (Haneda)

- New Engine run-up area was established near offshore area of Haneda and started operation from January 1994. The noise problem in the area was considerably eased by the operation of 7 spots in total.
- ANA built a new engine test cell in Oct 1995 taking into consideration the need to restrain low frequency noise. ANA is also accepting engine test operation from other companies. Further, in 1998, an APU run-up facility was installed in conjunction.

Haneda Airport ANA Aircraft Maintenance Center, Engine Test Cell and Run-up Area, Water Wash Area

④Noise Countermeasure on Maintenance Facilities and Vehicles

ANA has been diligently carrying forward the renewal of vehicles to the low noise type. All electric vehicles are all low noise type. This eliminated the disturbance of airport surroundings during maintenance at night. Also, for the super-cold region use low noise blower equipped state of the art de/anti-icing vehicle, the fleet started from 1 in 2000, increased to 4 in 2004, and in 2002 winter increased to a total of 5 vehicles.

Low Noise Type Electric Vehicle

State of the Art de/anti-icing vehicle fleet, low noise blower equipped (Front)

[Reference Material]

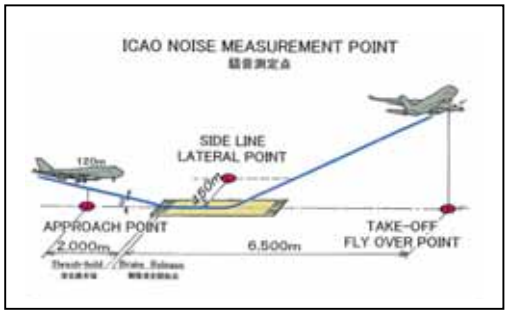
1. Chapter 3 Standard

3 Measurement Points

① Flyover reference noise measurement point：6.5km from the start of roll.

② Approach reference noise measurement point：2.0km from the threshold, 120m altitude)

③ Lateral reference noise measurement point：450m from the runway center line



2. Chapter 4 New Standard (33rd ICAO General Assembly Resolution)

① The sum of the improvements at three measurement points (Standard Value – Measured Value) shall be over 10EPNdB.

② The sum of the improvement at any two measurement points (Standard Value – Measured Value) shall be at least 2 EPNdB.

③ No trade-offs (decision to take into balance the entire system) permitted.

④ Applicable to new type aircrafts from after Jan 1st 2006.

⑤ Standard for newly constructed aircraft. Not a standard used for retirement of aircraft in current operation and operation restriction.

⑥ Specific consideration for exemptions for developing countries.

Haneda Airport Cargo Area's Waste Compactor

B747-400 in cabin waste compactor
(Totash Compactor)

(3) Recycle

ANA Group is focused on recycling, a major pillar of 3R. The major programs are outlined below.

①Cargo Department Programs

- Recover plastic sheets used for covering air cargo containers in order to repel water, dust from Narita, Kansai, Haneda, Itami airports. Recycle as solid fuel (RPF: Refuse Paper and Plastic Fuel) or plastic trash bags.
- When disposing ID Plates located on every aircraft cargo container, recycle as iron raw material or combustion facilitating material.
- Recycle disposed cargo containers as aluminum raw material.

②Maintenance Department Programs

- Recycle aircraft engine parts at end of useful life as special metal materials.
- Pilot program to recycle aircraft seat covers, wool socks, and blankets.

(Recycling Actual Results)

Aircraft engine parts, aluminum waste material	Metal raw material	5040K yen/year
Used airplane tickets (Nationwide)	Toilet paper	Approx 100 tons/year
Cargo container	Aluminum raw material	1930K yen/year
Cabin service cart	Aluminum raw material	
Cargo plastic sheet	Solid fuel, trash bags	
Used boarding pass (Nagoya)	Fan (give away)	1 ton/year
Furniture & other equipment from HQ relocation	Iron raw material, plastic raw material	94 tons
Cargo container ID Plate	Iron raw material, combustion facilitating material	Starting May 2004

(Recycling Pilots)

In-cabin magazines, time table	Business cards, picture books, etc
Paper cups for cabin service	Toilet paper, etc
Used boarding pass (Haneda)	Plastic raw material
Aircraft seat cover	Socks, slipper, etc
Aircraft carpet	Solid fuel

Company staff directly visually auditing the waste processing operation of cargo plastic sheets (intermediate processing) (Osaka Airport Branch)

Separation waste box inside headquarter (Shiodome) office

ANA Headquarters and sales related departments relocated last year from Mar ~ May from Haneda Airport and near Shinagawa to Shiodome City Center Building in front of Shimbashi Station. Un-needed tables, chairs, and partitions as the result of the move totaled up to 307 tons (7,800 pieces). ANA relied on Itoki Co. and sold or transferred to other divisions 201 tons (4,971 pieces), recycled 94 tons, and disposed of 12 tons and change. Recycle rate of 96% was reached.

Waste obtained during the corporate headquarter relocation is turned into this object *Giveaway* (Object for medical purposes)

2. Reducing Usage and Discharge of Harmful Substances

(1) Compliance with PRTR Law (PRTR = Pollutant Release and Transfer Register)

In FY2000, together with the Scheduled Airlines Association of Japan, we participated in a project to prepare a “PRTR manual for calculating the quantity of release, etc.” led by the Ministry of Economy, Trade and Industry. We organized the “Briefing session on the enforcement of the PRTR law for the air transport industry” at our company's meeting hall. In conjunction with these activities, in FY2001, along with adjusting the internal system of managing and reporting, we restructured our existing system for collecting and spreading MSDSs (Material Safety Data Sheets) so that the latest versions may be retrieved over our internal LAN.

ANA's chemical substances subject to the PRTR law are related to aircraft maintenance; we use approximately 500 items containing 45 kinds of chemical substances in total. However, many of these substances are used in extremely small quantities. The PRTR law-report required chemical (Tightened since 2004: 1 business location annually above 1 ton (depending on material 0.5 ton)) for ANA is Tributyl Phosphate (Law No. 354 contained in aircraft hydraulic oil). For the group companies, there are three chemicals from the aircraft paint and heavy maintenance company, ANA Maintenance (Osaka Prefecture): dichloromethane (No. 145), Phenol (No. 266),

Toulene (No. 227). Also 4 chemicals from ANA Nagasaki Engineering, which conducts the electro-plating of landing gear: Trichloroethylene (No. 211), chromium (6) compounds (No. 69), Sodium Cyanide (No. 108),

Further, although not subject to PRTR, the search for a substitute for MEK (Methyl Ethyl Ketone: Regulated Dichloromethane (No. 145) are reported.Under City Ordinance) used for painting and maintenance, is being conducted by ANA Maintenance Co and ANA Techno-aviation.

Major PRTR substances used by ANA and their applications

Chemical Name	Law No.	CAS No.	Main Usage (Material)
Tributyl phosphate	354	126-73-8	Aircraft hydraulic fluid
Toluene	227	108-88-3	Paint, thinner, sealant
Xylene	63	1330-20-7	Paint, thinner, sealant
Cellosolve acetate	101	111-15-9	Thinner
Polyoctylphenyl ether	308	9036-19-5	Cleaning agent
Ethylbenzene	40	100-41-4	Paint

Major PRTR substances used by ANA group companies and applications

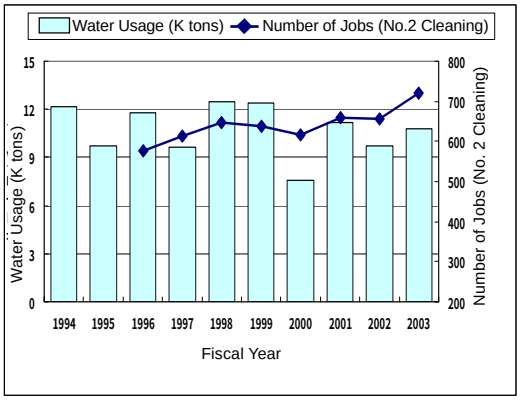
Chemical Name	Law No.	CAS No.	Main Usage (Material)
Dichloromethane	145	75-09-2	Paint removal
Trichloroethylene	211	79-01-6	Cleaning before electro-plating
Chromium (6) compounds*	69	7789-00-6 (Other)	Paint
Phenol	266	108-95-2	Paint removal
Sodium cyanide	108	143-33-9	Electro-plating
Dichloro-benzene	139	95-50-1	Cleaning of maintenance items
Cadmium*	60	7440-43-9	Electro-plating

*Specially identified Type 1 chemical compound

The compounds that ANA is reducing are the dichloromethane mentioned above and although not mentioned above because used only in small quantities, polyoctylphenyl esther and norylphenol ethoxylates.

(2) Aircraft Water Cleaning and Wastewater Treatment

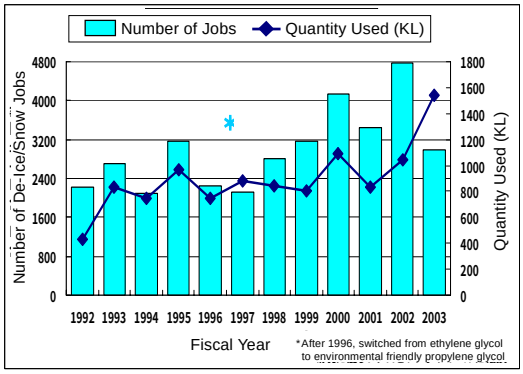
The wash activities inside the Haneda and Narita aircraft wash areas and hangars are as described in the graph. The wastewater is properly processed and then discharged into the public sewer. Although the cleaning agent still contains PRTR compounds, through the development efforts of International Airport Corp and ANA Maintenance Department and Technical Department, in the past 3 years, a 97% reduction has been achieved. The details are noted in Chapter 8, Environmental Protection Efforts and Social Contribution Activities provided by ANA Group Companies.



(3) Reduction of use of Anti/De-Icing Agent

For safety, aircraft cannot take off with snow or frost on the wings and flaps, body, etc.

During snow removal, a large quantity of hot water is used to blow off the snow (because it's dry snow during deep winter at Chitose Airport, compressed air is used). Anti-icing agent is then applied before departure.



Chapter 5 Waste and Recycling

<ANA's commitments and achievements>

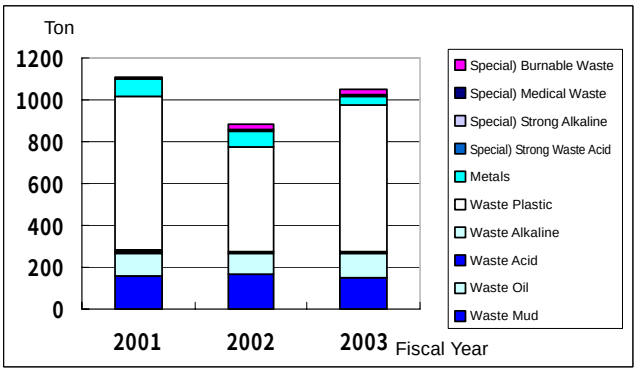
In order to reduce the impact on the environment, ANA group is working hard to implement waste's 3R (Reduce, Reuse, Recycle), reduction of the use and discharge of harmful substances, and green purchasing.

ANA has developed 100% reusable carbon fiber aircraft seat cushions, the first in the world of its kind. Besides using them on our aircrafts, we have also been introducing it to other industries.

1. The Current Situation of Waste and Solution

(1) ANA's Waste Materials

The situation of industrial waste discharge at ANA is as outlined below. In the future, ANA will strive to reduce amount of waste discharge and introduce 3R to reduce the final amount of waste to be processed.



ANA's Industrial Waste Trend (Including values from B767 disposal (77 Ton) in 2002)

At ANA, general waste is composed of 2,463 tons from the offices and 3,297 tons from the aircraft cabins. Also, there is wastewater of 11,842 tons from the aircraft cabin toilets. These are properly processed accordingly.

Also, at the aircraft maintenance factory, a factory wastewater treatment facility is installed. Wash water and others are processed and discharged to the public sewage system; ANA has discharged 21,651 tons. A staff canteen kitchen wastewater treatment facility is also in operation. The amount processed is 2,996 tons.

(2) Reduce and Reuse

ANA Group is taking the following measures to reduce and reuse waste.

(Reduction of Industrial Waste)

Changing the procedures for measuring the weight and center of gravity of the aircraft (measuring without emptying fuel tanks)
Recycle aircraft tires by remolding (maximum of 6x)
Repair aircraft parts and equipment and reuse (develop repair methods)
Recycle thinner, MEK used with aircraft paint (ANA Maintenance, Techno-aviation)
Recycle the active carbon used for the aircraft air-conditioning system and for water processing in the hangar
Clean engine parts using super high-pressure water (to reduce the use of chemicals)
Change the repaint method of aircrafts (Form 2001, paint over w/o removal of old coat)

(Reduction of General Waste)

Recycling of cabin waste (separating bottles and cans), compression of total trash
(ANA: B747-400, B777 international route aircraft equipped with trash compactor)
Re-evaluate cabin service products (types, quantity)

(Wastewater Treatment)

Processing and recycling of rainwater and kitchen wastewater.
Introduction of non- or low- polluting snow removing/frost preventing agent (In 1997:Ethylene Glycol→ Propylene Glycol)

In striving to improve, ANA Group switched totally to propylene glycol (environmental friendly material not addressed by PRTR law), reduced the use of anti-icing agent, developed equipment, and improved operating procedures. (Picture of de-snowing process is shown in Chap 4 Noise)

(4) Reduction of Emission of Vapor Gases During Aircraft Body Painting Procedure

A pilot for the introduction of low VOC (Volatile Organic Compounds) for aircraft exterior painting was done in 2002 for two aircrafts (B777 type aircraft). In Jul 2003, it was formally introduced. In FY2003, it was used on 15 aircrafts. In 2001, we introduced a new neutral paint-removing agent of non-methylene chloride type to avoid water and soil pollution. In order to promote the use of such paints and paint-removing agents, a heating system to warm the entire hangar at the ANA Aircraft Maintenance Co. was installed. Approximately 550 million yen was used to introduce the heating system in fiscal year 2002.

3. Green Purchasing

Starting in Jun 2002, a company wide purchasing system for purchasing all stationary and copy paper was introduced. Using this system, the promotion of green purchasing is measured. Also, an idea original to ANA, this system is also used for coordinating the centrally the recycling of un-needed files at each department.

In FY2003, actual result of green purchasing is 63% (FY2002 59%) of all purchased materials using the current system. Currently, the expansion to group companies is underway.

As an example of green purchasing, ANA uses a total of 2,400 tons of recycled paper (100%) for domestic and international time tables, and 4,300 tons of recycled paper (70%) for group company travel pamphlets. Also, although currently ANA calendars have been made from recycled paper (50%), a switch to FSC-Forest Stewardship Council Approved paper is being planned.

On Jul 2003, for the first time in the world, aircraft seat cushions made of carbon fiber were installed and put into operation on an ANA Boeing B767.

For many years, ANA aimed to develop a product that is light, fireproof, with high livability, and easy to dispose. This time, the product was developed through the cooperation of ANA Trading Co. and Osaka Gas (related patent pending).

In Aug 2004, besides putting it into operation on Airbus A320, it is selected for seats in Chubu International Airport (Centrair) scheduled to open next spring. Further, we are also dealing with other airlines and subways, automobile, aerospace industries.

B767 cabin seat

This carbon fiber seat cushion is 100% reusable during disposal and has a resell value.

Chapter 6 Social Contribution and Communication

[ANA's Commitment]

The ANA Group adopts the following measures as part of its social contribution activities. Our mottoes are: 1.To participate in social activities that benefit our future. 2. To be united with the local communities. 3. To encourage ANA employees to participate in social contribution activities. We will continue making progress by supporting various activities sponsored by many of the ANA Group's affiliated organizations.

1. ANA's Social Contribution Activities

It is our responsibility to preserve the best environment possible for the future generations. This is why ANA strongly believes in supporting social contribution activities.

Donation of Funds for an Elementary School in China

In September 2002, ANA donated funds for an elementary school in Hebei Province, China. This was the second donation ANA made for a school in China since it has first done so in 1997. It commemorated the 15th anniversary of ANA's first flight service to China and the 30th anniversary of re-establishing of diplomatic relations. Currently, 150 students are enrolled in this school.

Lily of the Valley Event (June 6th)

For the 48th time since 1956, ANA delivered a total of 18,000 "get well" bookmarks made from the lily of the valley, grown in Hokkaido to 32 regions via 29 airports throughout Japan. Bookmarks were hand made by 600 ANA cabin attendants and grand hostesses. They were delivered to 51 medical organizations including Red Cross Hospitals.

ANA's Blue Sky and Hope Elementary School (ANA Lan-tian Xiwang School) in Hubei Province

ANA employees making "get well" bookmarks

Red Feather Charity (October 1st)

ANA transported *red feathers and letters* to 39 regions in Japan, as part of *red feather - first mail by air* program. Flight attendants from 3 of ANA affiliated airlines joined for fundraising activities. In addition, 10 of ANA's aircraft were painted with the red feather symbol this year, making appearances around the country. This is the 42nd time ANA participated in this charity since 1962.

Green Feather Charity Campaign

Charity boxes were set up at ANA's Domestic Cabin Service Departments and Sections encouraging ANA employees to participate in the campaign. Cabin attendants pinned a "green feather" symbol on their uniforms during flight services to promote the charity.

Charity Fund Raising Activities in Aircraft Cabins

ANA cooperates with UNICEF's "Change for Good" fundraising activities by collecting foreign change from passengers. This activity mainly takes place during US – Japan flights. (since 1998).

The 1st Annual "My Blue Sky" International Environmental Picture Book Contest

The International Environmental Picture Book Contest (since 2003) was originally started in hopes of families and children to learn more about the environment, nature, living creatures and natural resources. Submissions were accepted from all over the world. 100,000 copies of the grand prize-winning book were published, and distributed free of charge to passengers, customers, and the general public via educational organizations.

"My Blue Sky" Reforestation Activities

As part of the Reforestation Project ("My Blue Sky" – 10 year Reforestation Project), the ANA Group employees have test-planted trees near Chitose Airport. The project took action in fiscal year 2004. In addition, the Coral Reef Preservation Project took action in Okinawa this year.

ANA Employees test-planting trees near Chitose Airport

Aircraft Maintenance Center Tour

Grand Prize winner of the 1st Annual International Environmental Picture Book Contest (Cover)

Okazaki Kaheita International Scholarship Foundation (established under ANA's second president)

This foundation provides scholarships for outstanding Asian students who wish to study abroad in Japanese universities. ANA co-sponsored the foundation, which was established in 1990. 12 students in fiscal year 2003, and 11 students in fiscal year 2004 have arrived to Japan under this scholarship program. (64 people from 7 countries arrived to Japan since its establishment).

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
China	2	3	2	7	7	9	10	7	6	5	3	4	5	5
Malaysia	2	4	3	4	2	2	3	1	1	2	2	2	0	1
Thailand	1	2	3	3	2	1	0	1	1	1	0	0	1	1
Indonesia	–	2	2	2	1	1	1	1	2	2	2	1	1	1
Philippines	–	1	2	3	2	1	0	1	1	1	1	0	1	1
Vietnam	–	–	–	–	1	2	3	2	2	1	2	1	1	1
Myanmar	–	–	–	–	–	–	–	–	–	1	3	4	3	1
Total	5	12	12	19	15	16	17	13	13	13	13	12	12	11

Aviation Classes and Aircraft Maintenance Center Tours

Aviation Classes: Open to institutions for the disabled, regular schools and the general public

Haneda Plant Tour: Fiscal year 2003, tourists total 38,871 (since fiscal year 1993, tourists total 253,411)

Narita Plant Tour: Fiscal year 2003, tourists total 4,439 (since fiscal year 1997, tourists total 19,139)

2. Environmental Communication

(1) Communication with Outside Organizations

The ANA Group has been publishing the annual Environmental Report for over 10 consecutive years since its first publication in 1992 (Heisei 4), and it's been widely read by both ANA employees and the general public. The English version of the report has been available since 1998, and it has been posted on the ANA web site (http://www.ana.co.jp) since 1999. Since 2001, the ANA Environmental Report has been available on the Environmental Report database developed by the Ministry of Environment. (http://www.kankyohokoku.jp)

ANA has been publishing environmental articles in its annual publications *Retrospect and Prospects* and *Annual Report*. In addition, environment-related news have been included in the *ANA Quarterly Statement of Accounts*, which is provided to our shareholders.

In July 2003, ANA hosted the "Environmental Forum" attended by 14 companies, providing a valuable opportunity for increasing environmental awareness.

Please feel free to contact ANA Environmental Division (kankyou@ana.co.jp) for any inquires.

Below is a chart outlining the current status of ANA's affiliations with Environmental Organizations.

Fiscal Year	Organization	Contents
1991	Environmental Information Center	This organization provides science and technology information on environmental conservation. ANA has provided support for the establishment of this organization.
	Global Environmental Forum *Environmental Study Group*	This group's activities include conducting scientific research and exchanging information on global environmental issues. They also provide global support for environmental conservation activities. ANA is registered as an official member.
	Japan Flower Promotion Center	Following the concept from the International *Flower and Green Exposition*, this organization promotes the spread of flowers and greening of national land (under the Ministry of Agriculture, Forestry, and Fishery). ANA has provided support for this organization.
1992	Greening of Land Promotion Institute	ANA has provided support for this institute, promoting the greening of land (under the Ministry of International Trade and Industry as well as the Ministry of Agriculture, Forestry and Fishery).
	IATA Environmental Task Force (ENTAF)	ANA has been a regular attendee since the *5th Annual Meeting*. (May 1992). ANA co-sponsored the first international seminar for *Aviation Environment* held in Washington DC (March 1993) organized by IATA.
1993	International Noise Control Engineering Conference	ANA has participated in the *23rd Inter-Noise Conference and Exhibition* held in Yokohama (1994).
	Council on Life-Innovation	ANA has participated in the *Asian Survey Mission on Development and Environment* hosted by this organization.
1994	Tokyo Implementation Committee for Global Environment	ANA has provided support for the *Tokyo Meeting on Global Environment* held in October 1994.
1995	Oze Protection Association	ANA has provided support for various projects protecting Oze and *Nikko Cedar Trees*, sponsored by the Tochigi, Nikko Cedar Tree-Lined Streets Funds.
1996	Green Purchasing Network	ANA has registered as a member of the Network to support promoting eco-friendly products to the consumers. (member since February 1997)
1997	Kyoto Conference to Mitigate Global Warming (UNFCCC COP3)	ANA has made a donation to COP3 to a conference held in December 1997.
1999	Japan National Trust	ANA has provided support for activities protecting Japanese tourism resources such as cultural assets and natural scenery.
2000	Star Alliance Environmental Consultation Meeting	After joining the Star Alliance Association, ANA has hosted the *Star Alliance Environmental Consultation Meeting* held in Tokyo.
	Green Port 2000 (Narita)	ANA has provided support for the World Conference and Exhibition, co-hosted by ACI (Airport Council International), Narita Airport Co. and IATA (International Air Transport Association).
2001	Environmental Sub-committee, Scheduled Airlines Association of Japan	This is a committee originally started as an environmental liaison group formed by 3 airline companies. The Environmental Sub-committee was newly set up under the supervision of the Regular Airline Association's Planning Committee. ANA has participated in the establishment of the new committee.
	ECOmmerce Frontier Group (EFG)	This group was established as part of the ECOmmerce organization. Activities include consulting and networking with various industries. ANA has been an original member since its foundation.
2002	UNEP International Aviation Environmental Symposium	An ANA representative was invited as a panelist for the "International Aviation Environmental Symposium" co-hosted by UNEP and European NGOs.
	The Sustainable Management Forum (SMF) The Sustainable Management Rating Institute (SMRI)	ANA has participated in the first *Sustainable Management Rating* conducted by SMF, which was funded by organizations including the Ministry of Education and Science. (since 2002)
2003	NGO Asia-Pacific Coalition for Environment (ACE)	This organization was established for the purpose of solving environmental issues focusing on the Asian-Pacific region. ANA has participated in organizing symposiums hosted by ACE, and provided support for various activities.
	"My Blue Sea" - "Churaumi Coral Reef Preservation" Team	ANA has registered as a member of "The Churaumi Coral Reef Preservation Team". The team was founded in association with the Okinawa Government and participating corporations based in Okinawa. (co-sponsored by The Ministry of Environment, The Cabinet Office, Okinawa Government, Onna Village), and is officially scheduled to take action in fiscal year 2004. ANA has provided support for organizing symposiums etc.

In addition, ANA participates in the following environmental organizations within the airline industry.

- ANA Group Airlines Society (ANA, ANK, AJX, and NCA).
- ANA Group Global Environment Contact Group (38 group companies, increased by 8 companies from last year).
- Scheduled Airlines Association, Environmental Sub-committee.
- Star Alliance Environmental Working Group.
- Star Alliance Environi
- International Air Tran
- Alliance of Asia-Pacifi
- International Commercial Airlines Organization (ICAO), CAEP Jet Gas Working Group.

ANA's affiliations with JWS (NPO Corporation)

(JWS: Japanese Association for Women in Sport)

In 2006, the "International Conference on Women and Sport" will take place in Kumamoto, Japan (May 11 – 14), co-sponsored by the City of Kumamoto, Kumamoto Prefecture, Japanese Olympic Committee and JWS (NPO Corporation). Over 700 people from 100 regions are expected to attend.

The Sport and Environment Committee, in association with the International Olympic Committee (IOC), has selected *advancements of the female role in sports* as one of the *21 Agendas for the Olympic Movement* during the "3rd International Conference on Sports and Environment" held in 1999.

Topics related to "Sports and Environment" will be discussed for the very first time during the "2006 International Conference on Women and Sports-Kumamoto". The ANA Group has been a tremendous support for our organization and activities, and we look forward to continue our mutual friendship for many years to come.

Chairman, JWS (NPO Corporation)
Etsuko Ogasawara

(2) Communicating within ANA

The ANA Group held the "9th annual ANA Group Environmental Issues Contact Meeting" (27 affiliated companies participated) in September 2003, and discussed how we could contribute to improve our environment.

In addition, from June to July, ANA conducted an environmental survey targeting ANA employees, and receiving high volume of responses. (Approximately 5,500) In the July issue of our company magazine *ANA NOW*, we have published a centerpiece story on global environmental issues. Updated news and event information related to environmental issues are posted on our intranet site "KWin", and viewed by many of ANA employees daily.

Chapter 7 Topics since April 2004

[ANA's activities since April 2004]

ANA's environmental activities are ongoing. Below are outlines of recent topics from April to July 2004.

International Environmental Picture Book Contest (April ~)

ANA has published the grand prize-winning book of the *1st International Environmental Picture Book Contest (2003)*, and distributed them to flight passengers and the general public via educational organizations. We have received many positive responses from the readers. We are currently evaluating the submissions for the "2nd International Environmental Picture Book Contest", which we have received from May through September, 2004. We are excited to announce the winners shortly.

***The Reforestation Project* and *the Coral Reef Conservation Project* (May)**

Both projects were officially started this year. This spring, ANA employees have planted trees at the following 3 locations: Izuyugashima, Hakodate and Chitose. In addition, ANA employees have traveled to Onnamura, Okinawa to participate in the *Coral Reef Conservation Project*. The local community has been a wonderful support for both projects. We are scheduled to plant additional trees this fall in Yugashima, Chitose and Miyazaki. Our goals are to preserve the beauty of the land, and to reduce the amount of CO2 present in the atmosphere.

Green Feather Charity Campaign (May)

2004 was the first year for the *Green Feather Charity Campaign,* and ANA has encouraged employees to actively contribute to this charity. Many of our customers also supported the charity by making donations at restaurants, shops and hotel front desks.

ANA Honored by the Sustainable Management Rating Institute (SMRI) (June)

ANA was presented the *11 companies of Best Practice* award by the Sustainable Management Rating Institute (SMRI) (- refer to chapter 9).

ANA Participates as an exhibitor for 2 environmental events (June)

For the first time during the month of June (Environment Promotional Month), ANA participated as an exhibitor in two environmental events, one in Yoyogi park and another in Makuhari Messe. Total of 140,000 people attended the two events, and provided valuable opportunities for ANA to communicate directly with the general public. Ms. Koike, Minister from the Ministry of Environment, made an appearance at the ANA group booth.

ANA Environmental Report airs on Internet Television (June ~)

ANA's Environmental Activities were introduced via Internet Television (www.channelj.co.jp). 4 topics of the past episodes include (1) Winners of the International Environmental Picture Book Contest (2) Reforestation Project (3) Eco Fair 2004 hosted by the Ministry of the Environment (4) Coral Reef Conservation Project. Topics related to *Environmental Effects by Aircraft* are scheduled to air this fall.

ANA to enforce the Third Party Review Policy for environmental audit (July)

ANA has concluded the *2nd ANA Group Environment Compliance* last year. This year, ANA began to enforced the *Third Party Review Policy* in order to adjust to the complex environmental laws. Under this policy, ANA has made arrangements to send experts onsite to overview the disposition of industrial wastes, which is currently managed by companies under ANA's contract. We will report the results in fiscal year 2005.

ANA to Order B7E7 Aircraft (July)

Boeing 7E7, with its capacity and the latest engine technology, has the capability to decrease the average fuel consumption by approximately 20%. The latest engine technology enables the reduction of harmful wastes such as CO2 and more. We are proud to present our *Latest Aircraft of the 21st Century*, which at the Paris Aircraft Exhibition was named the *Dream Liner*. As the leader in environmental awareness, ANA ordered 50 of these aircraft, becoming the first airline to order this model. The "Super Efficient" B7E7 are scheduled to enter service in 2008 replacing the B767-300 models.

Chapter 8 Environmental Protection Efforts and Social Contribution Activities provided by ANA Group Companies

[ANA Nagasaki Engineering Co., LTD.]

Reducing Chemical Substances

We are one of the few companies in the world that offers the *inclusive overhaul process* (approximately 30 processes in one) specializing in landing gears (legs), ranging from jumbo jets to small-sized aircrafts. Since we run a surface coating facility (plating facility) within our factory, we use great amount of chemical substances. In order to avoid harmful chemicals flowing out of our factory, our facility is strictly managed by the completely enclosed system. In addition, we hire specialists to handle disposable substances properly. Listed below are details of our recent and ongoing activities.

(Use of plating substitutes under examination)

We are currently researching how to use eco-friendly substances in order to reduce the use of chemical substances. There are 3 types of chemical substances, which we often use. First substance is trichloroethylene, a chlorine solvent used for steam cleansing. Second substance is chromic anhydride (Chromium (VI) Compound) used for Cr (Chrome) plating. Third substance is sodium cyanide, the main component of Ti-Cd (Titanium/Cadmium) and Cd (Cadmium) plating, used for preservation. Although manufacturing companies are currently researching substitutes for these 3 main substances, the solutions are still not viable. As a substitute for Cr plating, there is HVOF (Thermal Sprayers) technique, which has been partially used for mechanical parts. We are currently testing this new technique. [Reducing chemical substances]

(Alternate paint remover)

During the maintenance process, chlorine solvent (a paint remover which contains dichloromethane) has been used as a paint remover. Since dichloromethane is a harmful, highly volatile substance, we have been looking for an alternative paint remover, which does not contain dichloromethane. We have discovered non-chlorine solvent as an alternative, which is just as effective. We have been using this new product since April of fiscal year 2004. As a result, our technicians are now able to work without being exposed to related health risks. In addition, the new product has been excluded from the list of *The First Category of Chemical Substances* authorized by the PRTR Law. [Removal of harmful chemical substances]

(Reducing volatile organic solvents)

We have been working on reducing volatile organic solvents such as MEK, toluene and xylene, which are contained in epoxy and polyurethane paints used during the painting process.

We are investigating the use of *high solid paint* that contains less volatile organic solvents, and which has been applied to B777 since 2002. We have repeatedly tested this product using test pieces. We have also focused on improving the work environment for our technicians. Compared to the regular paints, the new paint takes longer to dry. In order to meet our needs, we have opened a new eco-friendly painting facility in November 2003, providing an efficient, risk free working environment. We are planning to use the new product for other aircrafts in the near future.

The new eco-friendly paint facility.

[Reducing chemical substances]

[Air Hokkaido Co., LTD.]

Aircraft Tour and Lectures for Kindergartner students

On Tuesday, July 13th 2004, Air Hokkaido invited students from Hakodate University of Education affiliated kindergarten located in Hakodate City for an aircraft tour. The aircraft tour started a few years ago in addition to the airport tour we have been hosting for Hakodate Educational University.

Total of 69 children visited the Air Nippon hangar inside Hakodate Airport, and participated in an hour-long tour and lecture. During the Q&A session, the curious children asked numerous questions such as “How does an airplane fly?” “Why do airplanes have 2 engines?” occasionally leaving the crews and engineers stirred with a response such as “Let's see…How can I explain that to you…?” The children took an aircraft tour all the way from the passenger seats to the cockpit, and then experimented with the control stick while fantasizing of becoming a pilot. We are proud to say that the tour was a success making many children smile. (Even the teachers said, “I want to try too!”)

Based in the isolated island of Hokkaido, we are often confronted with issues of severe weather. Fog is the main issue during the summer season, while wind and snow take over during the winter season. It is crucial for our pilots, flight attendants and engineers to work as a team in order to overcome these problems and keep our aircraft flying.
During the severe winter season, we predict in advance exactly when we would be facing a snow echo (a condition that blocks the pilot's view - Blizzard), and make arrangements to remove the snow from the runway just in time for landing. Dealing with the nature properly is definitely our key to keep our aircraft flying.

The children were given the privilege to examine DHC-6 (Twin Otter), which has survived through many of such difficult situations.
When the seas become impassable due to severe condition, flying is the only mode of transportation available for those people who live in the isolated islands.
We will continue providing safe and reliable transportation services for the residents of Okushiri Island.

Regardless of the small-sized aircraft or flying short distance, Air Hokkaido is honored to be able to make valuable contributions to the society.

Aircraft Tour at ANK hangar in Hakodate

[International Airport Utility Co., LTD.]

Environmental Efforts associated with Aircraft Washing

As the core part of the ANA Group, the International Airport Utility Co. (IAU), operating 24 hours a day, performs various duties at Haneda airport, the largest domestic hub in Japan, and Chitose airport, the main airport in northern Japan. IAU provides various ground handling duties that include directing aircraft to various locations (Marshaling), loading and unloading of freights and luggage, maneuvering the Passenger Boarding Bridge, transporting the aircraft (Towing and Push back) and cleaning the aircraft inside and out.

In order to prevent damage and protect the condition of aircraft, they are washed at the ANA hangar or other restricted areas inside Haneda Airport that is equipped with a water draining facility. The washing normally takes place during nighttime.

In 1999 (H11), the PRTR (Pollutant Release and Transfer Register) law has enacted a new set of regulations entitled *Acknowledging Chemical Discharges to Improve Environmental Protection*. Since 2001, all airlines are required to report the amount of chemical substances used according to the *First Category of Chemical Substances* list.

We have been investigating the use eco-friendly cleansers, to provide eco-friendly work environment; long before the new PRTR law has gone into effect. In association with Taiyo Maintenance Inc. and under the authorization of ANA Maintenance Department Engineering Division, we have managed to cut 80~100% of the chemical substances included in the PRTR list by fiscal year 2003.

For example, we have tested Alkali cleanser (substance not on the PRTR list) instead of Kerosene cleanser (contains 1.1% Xylene) for cleaning off Carbon stains and Hydro Oil stains, and achieved positive results. Since then we have conducted further research and testing for 2 years. (We only use cleansers approved by aircraft manufacturing companies and ANA.)

Change in use of chemical substances authorized by the PRTR law (rate: kg)

Name of substance authorized by the PRTR law / Fiscal Year	2000 (H12)	2001 (H13)	2002 (H14)	2003 (H15)	Reduction Rate
Poly (Oxyethylene) Octylphynel Ether	544	162	92	0	100%
N-Alkylbenzenesulfonic Acid Sodium	178	54	31	0	100%
Nonylphenol Ethoxyrate	374	248	21	19	94%
Ethylene Glycol	160	33	26	24	85%
Xylene	192	47	8	0	100%

Other environmental efforts

With the support from the manufacturing company, we have recycled a total of 1075 cleanser containers this year.

In addition, during the loading process, we have started recycling paper mats (used for covering freights), and reduced the amount of mats used from 7000 mats per month down to 3400 mats per month this year (48% cut). The paper mats recycled were converted into cushion sheets to protect the freights from damages.

We will continue making efforts to protect our environment.

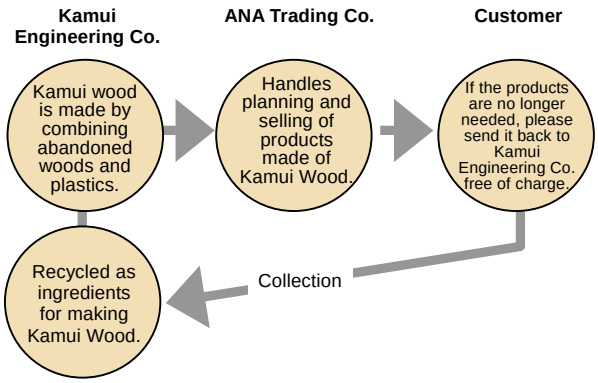
[ANA Trading Co., LTD]

Selling recycled materials to prevent the waste of natural resources

ANA Trading Co. has been participating in environmental contribution activities by selling eco-friendly products via ANA's mail order catalog "ANA SKY SHOP".

"Kamui Wood", a material made from combinations of abandoned woods and plastics (such as caps from the soda bottle) is perfect for recycling. Stronger than oak, this artificial wood is durable and waterproofed. It is suitable for exterior use such as outdoor benches and decks.

Kamui Engineering Co., the manufacturer of the "Kamui Wood" is a venture business based in Shibecha-cho, Hokkaido. It was originally started as a university project with the purpose of eliminating wastes within the local community. ANA Trading Co. was deeply impressed by their company philosophy *Reviving the environment! Reviving the local community!*, and since then signed on as a business partners. As a collaboration project, the ANA exclusive product "Kamui Wood Flower Box" was born.



How to "create products that never get wasted" and recycled forever

A flower box made of Kamui Wood

The intelligence of this recycling system is that we are "creating products that never get wasted." If the customer is no longer in need of the product, they can simply send it back free of charge, and then the product will be recycled to be made into Kamui Wood once again.

ANA Trading Co. will continue to develop plans and support environmental organizations and companies in order to reduce deforestation, and recycle valuable resources, therefore preventing waste. We will continue making the best efforts to protect our nature.

In addition, ANA Trading Co. has been focusing on protecting ocean ecosystem. We have been making efforts to develop a culture medium for artificial seaweed cultivation in order repair the damage done to the underwater ecosystem. We are eager to participate in development of new technologies to support the growth of artificial seaweed.

Chapter 9 ANA's activities

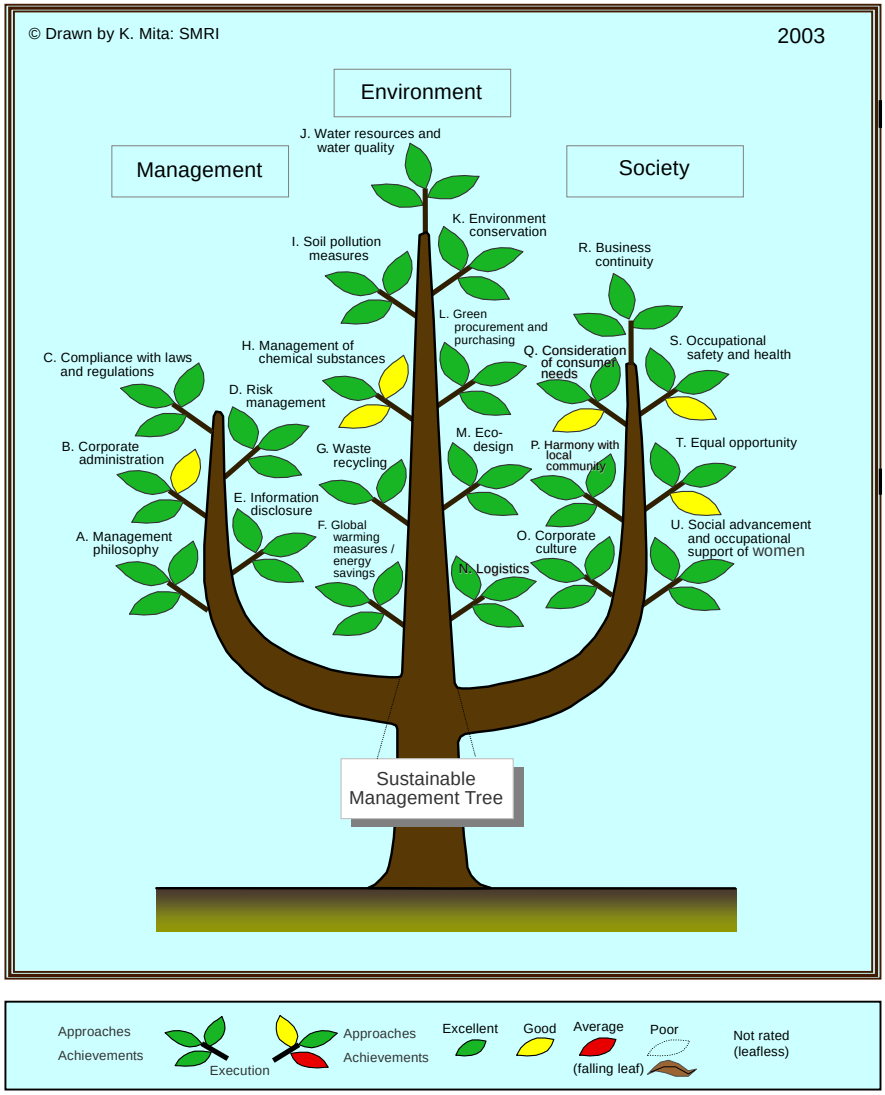
ANA group uses the results of the ratings and commentary by the third parties to improve our future performance. We are still not satisfied with the current results, believing that we can do better; we appreciate any useful feedback so that we can improve our performance in these areas in the future.

1. Rating program evaluation

(1) The Sustainable Management Rating Program

Since fiscal year 2002, ANA received a *Sustainable Management Ratings* from the *Sustainable Management Forum of Japan* / Sustainable *Management Rating Institution Program*, a non-profit organization that researches and rates sustainable management projects. ANA was recognized as one of the top 11 companies out of the field of 75 that were rated, and received the *Best Practices Award* last year which recognizes ANA as a leader in the area of clear CSR accountability of the top level management.

The following figure describes the 2003 results of sustainable management rating.



The tree figure of Sustainable Management Rating

There are three business areas (trunk): management, environment and society. These areas are classified into item type, which are shown in alphabetical order (leaves) in the tree. The leaves in each item show approach, execution and achievement, and the color of the leaf indicates the rating: green, yellow, red and falling leaf. Comparing the new results to the 2002 rating, ANA obtained good results having the leafy tree with few yellow leafs and without red ones.

(2) International sustainable management rating by *Innovest*

ANA receive a rating of A from the Innovest Co., a US-based international sustainable management rating institute. This was 5th best result of the world's major airlines* (1st in Asia).

*13 airlines, including Lufthanza (LH), British Airways (BA), Air France (AF) and Delta airlines (DL)

2. Third party review

From this year, ANA put a sub-title, *Sustainability for Society*, on their annual environmental report. In the title, I have found their corporate management policy's effort to highlight environmental management. Here are some of my opinions regarding ANA's position as a representative of Japanese airlines in the future, and the need for future improvement.

Environmental NGO
Asia –pacific Coalition for Environment (ACE)
Representative Yujiro Eguchi

1. ANA needs to create a total image as a sustainable company. More explanations of the *ANA Group Corporate Philosophy and Environmental Policy* are required to make the image clear.
2. Airline industry is essential for our lives. However, airline business places a great burden on the environment through massive consumption of fossil fuel and emissions of carbon dioxide gas caused by the fuel consumption around the stratosphere. In the *ANA Group Ecology Plan 2003/2007* and *Review of fiscal year 2003*, ANA disclosed their achievements and problems clearly by comparing its current plan with previous performance. From now on, it is better to clarify the total amount of all kinds of environmental burdens which are created by the ANA's corporate activities. Furthermore, set goals to mitigate these burdens and describe quantitatively the measures for reducing problems, approaches for achieving efficiency (and effects resulting from achieved efficiency) through the use of graphs and figures.
3. ANA works actively toward addressing environmental issues and tries to fully disclose their information. However, parts of this information are too complex for general public to understand. Even though it is very difficult for a company to communicate clearly with its stakeholders, it still it is important. I expect ANA to apply additional efforts on communicating clearly and coherently, structuring reports, creating graphs and figures, as well as publishing other detailed information..
4. As a star alliance member, ANA's perspective in the global management is important. The international comparison among star alliance members also clearly shows that there are differences in management strategies in the field of social contribution.

I look forward to the next year's environmental report, and hope that my opinions are taken into consideration.

Environmental NGO

Asia –Pacific Coalition for Environment (ACE)

ACE creates proposals and performs activities for environmental economy, management and diplomacy with the aim of building a global Asian environmental and economic area upon the idea of environmental capitalism that accounts for the sustainability of a human and corporate wellbeing. As part of our activities, ACE implements Environmental Peace Project in the three Middle-Eastern countries (Palestine, Israel, Jordan) and hosts the Asia-pacific Children Conference.

3. Comments from reader's questionnaires

In the last fiscal year, we receive numerous comments from individuals and corporations regarding our report. We thank our readers very much.

Readers' comments	Our response
・Little difficult. I prefer a more understandable report for general public. ・Too many technical terms. Hard to understand for an outsider. ・Text fonts used are too small, and hard for aged people to read. ・Little hard to understand the Environmental Data	We tried to switch to general terms without using technical ones as much as possible. We also enlarged some tiny text parts on graphs. Environmental Data is expanded and contains more comments.
・Good to see many graphs and the abbreviations page.	We try to select and update more graphs and abbreviations.
・Applaud ANA's environmental activities but Environmental report is hard to read. ・Two-tone color prints is nice and easy to understand. ・Very honest and contains little self applauding. But expect more communicable contents.	The book binding of the report is simple but we put more efforts into making it easy to read. We designed the report for easy reference by clearly describing connection between actual activities, achievements and environmental report data. In addition to this report, we also expand environmental communication through our on-board magazine *Wing Span*, TV and newspaper.
・Desire to see the connection with other airlines in other countries	We described the background and introduction of the most advanced fuel saving aircraft.
・Applaud ANA's active formulation and implementation for ANA Group Ecology Plan.	We inserted into this report the annual review pages in order to not only report our planning activities but to highlight our achievements as well.
・Prefer to see more graphs and figures in the chapter of global warming and domestic response, otherwise I lose the interest to read because of too many complicated sentences.	We made the chapter shorter than last year. Also, we tried to convey the information clearly by separating it into parts dealing with aviation and others.
・Prefer to see more examples for recycling.	We listed examples including trials in chapter 5.
・Would like to know about waste in the aircraft cabin and specific things that passengers can do to help.	Thank you very much for expressing an interest to help us. We provided some information in the Waste and Environmental Data section.
・Nice to read the Third Party Opinion. Prefer to hear those opinions from specialists and NGOs.	We received comments from NGOs this year.

Opinion from environmental engineer company

Okishiro International Co., Ltd.

We handled the following environmental operations at each of ANA's business locations for over 20 years: 1. Design and manage the wastewater processing equipment at the maintenance factory. 2. Industrial waste recycling consulting for waste reduction and engineering for appropriate disposal. 3. Collection, transport and disposal of the industrial waste. Currently, many cases of water pollution and illegal industrial waste-disposal happen. There is no such thing as paying too much attention to waste management, especially by companies which have a big social influence such as ANA. To that point, we ourselves feel the need for a new advanced approach to enhance ANA Group's waste management monitoring and to consolidate their environmental network

Abbreviations

ACI	Airport Council International: The ACI was established in 1991 and is the international association of the world's airports.
AEA	Association of European Airlines: Cooperative body for European airlines (28 Airlines).
AESA	Atmospheric Effects of Stratospheric Aircraft Flyer
APU	Auxiliary Power Unit: APU ensures an aircraft's energy supply and air conditioning when no infrastructure is available on the ground. Also it provides pressurized air for engine starting
ASK	Available Seat Kilometers: The available number of passenger seats multiplied by the distance flown in kilometers
ATEC	Association of Air Transport Engineering and Research: ATEC is one of the public foundations in aviation society in Japan and was established on September 13, 1989 based upon contributions from major air carriers in Japan namely JAL, ANA and JAS. The foundation is a non-profit organization under the supervision of Civil Aviation Bureau of Japan. Their primary objectives are to contribute to the flight safety and enhancement of any activities toward improvement and/or development in the flight operation and maintenance.
BAU	Business As Usual: Executing business processes without taking measures to prevent global warming.
BOD	Biochemical Oxygen Demand: Total amount of oxygen consumed in the biochemical process to decompose organic constituents present in the water.
CAEP	(ICAO) Committee on Aviation Environmental Protection: CAEP is a technical committee responsible directly to the ICAO Council. CAEP is responsible for keeping the Annex 16 Standards.
CFC	Chlorofluorocarbons: Certain halogenated hydrocarbons used for fridge/ freezer's refrigerant and detergent for washing electronic parts. It is best known under the trademark Freon includes chlorine and fluorosis. It is an ozone depletion substance as well as a greenhouse gas.
CH4	Methane gas which has the smallest molecular mass out of all hydrocarbons. There are two sources of CH4; first is a natural source, from swamps and lakes, second is a man-made source from leaks of natural gas, livestock, agriculture fields and landfills. It is considered that CH4's greenhouse effect is 21 times worse then CO2's effect. Aircraft NOx Emissions are expected to decrease tropospheric methane concentration.
CNS/ATM	Communications, Navigation and Surveillance Systems for Air Traffic Management Communication: Uses Data-link with phonetic communication system for the conveyance of data and messages, and uses Satellites instead of Hi-fi for oversea communication. Navigation: To replace the assisting navigation equipment on ground such as VOR/DME or ILS system with ground navigation satellites system (GNSS). Surveillance: To replace the oversea phonetic location report system as well as conventional radar function with the Automatic Dependent Surveillance (ADS). Air Traffic Management: To synchronize the operation of CNS and to reduce some procedures for the management. To provide more appropriate routes for aircraft within the limited space. See FANS.
CO	Carbon Monoxide: Toxic and combustible gas formed by incomplete burning of substances containing carbon, e.g. fossil fuels.
CO2	Carbon Dioxide: Gas resulting in nature from the burning or decomposition of organic masses and the breathing process of humans and animals. CO2 is an important greenhouse gas. Global warming caused by the increasing amount of CO2 in the atmosphere due to the burning of fossil fuels is identified as a problem.
COD	Chemical Oxygen Demand: Essential oxygen total amount for oxidizing organic chemicals and minerals in the water and waste water.
COP	Conference of the Parties (to the UNFCCC): Annual conference among signatory counties of UNFCCC.
CSR	Corporate Social Responsibility
DPM	Diesel Particles Matter: Suspended particles coming from the exhaust of diesel cars.
ECAC	European Civil Aviation Conference: A forum for cooperation and coordination between European national authorities in matters related to civil aviation. There are 37 signatory counties and 38 members.
EPNdB	Effective Perceived Noise Level (dB): A unit commonly used in an aviation context to express the average perceived noise level.
ETOPS	Extended-Range Twin-Engine Operations: Most twin engine aircraft are certified so that has to be able to fly normally within an hour of an airfield in the event of an emergency. The ETOPS program allows operators to deviate from this rule under certain conditions. By incorporating specific hardware improvements and establishing specific maintenance and operational procedures, operators can fly extended distances more than 120 min from the alternate airport. ANA has implemented this operation in 1989. In 2002, ANA took advantage of the certification for a B777-200ER/ETOPS of 207 min in its

service between Japan and North America. It leads to higher fuel efficiency.

EU European Union: Political and economic union based on European community. As of May 1, 2004, there are 25 signatory countries.

FANS Future Air Navigation System: FANS is the adaptation of modern technology to enhance communication links between aircraft and air traffic controllers, improve a pilot's ability to safely navigate his aircraft and increase an air traffic controller's capability and capacity to monitor and control flights. In the mid-90's, the Future Air Navigation System (FANS) committee defined a plan for Communication Navigation Surveillance (CNS) and Air Traffic Management (ATM) - launching the next generation of en-route and terminal area airspace management concepts. See CNS/ATM.

FCCC (United Nation) Framework Convention on Climate Change: The 1992 United Nations Framework Convention on Climate Change is one of a series of recent agreements through which countries around the world are banding together to meet this challenge. In 1989, FCCC was declared at the ministerial meeting on air pollution and climate change.

FIP Federal Implementation Plan

FMS Flight Management System: The Flight Management Computer System (FMCS), in conjunction with other interfacing equipment in the aircraft, forms an integrated, full-flight regime control and information system which provides automatic navigation, guidance, map display, and in-flight performance optimization.

g/KN Gram / Kilo Newtons: Total amount of emission per unit of engine thrust on LTO cycle.

GSE Ground Support Equipment: Generic term of ground support equipments such as vehicles used for on/off -boarding of passengers and cargo.

GPS Global Positioning System: The Global Positioning System (GPS) is a worldwide radio-navigation system formed from a constellation of 24 satellites and their ground stations. GPS uses these satellites as reference points to calculate positions accurate to a matter of meters, with advanced forms of GPS to better than a centimeter.

GPU Ground Power Unit: Power supply for aircraft's electrical and air conditioning systems deployed on the ground during maintenance. There are both portable and fixed GPU.

GWP Global Warming Potential: The GWP is the ratio of the warming caused by a substance to the warming caused by a similar mass of carbon dioxide. Thus, the GWP of CO2 is defined to be 1.0.

HC Hydrocarbons Chemical compound of carbon and hydrogen
Unburned Hydrocarbons: Mixture of hydrocarbons that results from incomplete combustion processes.

HCFC Hydrochlorofluorocarbon; A compound consisting of hydrogen, chlorine, fluorine, and carbon.
The HCFCs are one class of chemicals being used to replace the CFCs. They contain chlorine and thus deplete stratospheric ozone, but to a much lesser extent than CFCs. This class of chemicals has higher global warming potential. They are used as fridge/ air conditioner's refrigerant, foaming agent for insulating foam and aerosol propellant.

HFC Hydrofluorocarbon: A compound consisting of hydrogen, fluorine, and carbon.
The HFCs are a class of chemicals replacing CFCs. All HFCs have an ozone depletion potential of 0. Some HFCs have high GWPs. They are used as fridge / air conditioner's refrigerant, foaming agent for insulating foam and aerosol propellant.

IATA International Air Transport Association: The general organization of international commercial aviation established in 1945 with 275member airlines in 143 countries (as of May, 2005).

ICAO International Civil Aviation Organization: A specialized agency of the United Nations for international civil aviation.

IPCC Intergovernmental Panel on Climate Change: An official intergovernmental panel of experts established by UNEP (United Nations Environment Program) and WMO (World Meteorological Organization) to assess the consequences of human-induced climate change.

ISO International Organization for Standardization

LTO Landing/Take Off Cycle: To control pollutants from aircraft in the vicinity of airports, ICAO established emissions measurement procedures and compliance standards for soot, unburned hydrocarbons, carbon monoxide, and oxides of nitrogen. A landing and take-off cycle was defined to characterize the operational conditions of an aircraft engine within the environs of an airport. It consists of 4 thrust settings for subsonic aircraft and the time in mode value.

Operating mode	Thrust setting	Time in mode (min)
Take-off	100%	0.7
Climb	85%	2.2
Approach	30%	4.0
Taxi / Idle	7%	26.0

MSDS Material Safety Data Sheet: MSDS is a measure for providing information about properties and handling procedures of specified chemical substances by business associates.

NASA	National Aeronautics and Space Administration
NO2	Nitrogen Dioxides: It forms in the combustion process and is an important air pollution material.
NOTAM	Notice To Airmen: Issued by each of the aviation agencies, NOTAM is a way of providing information about airline facilities, flight operations, emergency matters.
NOx	Oxides of Nitrogen Chemical compound consisting of one nitrogen and several oxygen atoms. NOx are generated in combustion processes under high pressures and temperatures. These parameters have been increased in modern engines to reduce fuel consumption, and emissions of CO and HC. In the future, emissions of NOx are expected to decrease by 85% because of a new exhaust pipe design.
N2	Nitrous Oxides: One of the greenhouse gases. No emissions from aviation.
O3	Ozone. Molecule consisting of three oxygen atoms.Close to the ground it is a component of smog. In the stratosphere ozone absorbs ultraviolet light. Nitric oxide emissions from air traffic at cruising altitudes cause an increase in atmospheric ozone.
ODA	Official Development Assistance
ODP	Ozone Depletion Potential: The ODP is the ratio of the impact on ozone of a chemical compared to the impact of a similar mass of CFC-11. Thus, the ODP of CFC-11 is defined to be 1.0.
PCB	Polychlorinated biphenyl: PCBs are mixtures of synthetic organic chemicals. Due to their non-flammability, chemical stability, high boiling point and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications. Concern over the toxicity and persistence in the environment and health effects prohibited the manufacture, processing, and distribution in commerce of PCBs.
Ppm	Parts per million: A unit used to describe the contamination level of water and air. ISO recommends using micro- gram / gram for quantity and micro-litter / gram-litter for volume instead of using ppm.
RDF	Refuse, Derived and Fuel wastes material**:** Generic term for recycled fuel material. Fuel coming from recyclable materials such as refuse and burnable domestic garbage.
RPF	Refuse, Paper and Plastic Fuel: RPF is a new type of recyclable plastic fuel derived from discarded paper and plastics. RPF is considered to be of a higher quality then other RDF types.
RPK	Revenue Passenger Kilometers: The number of revenue passengers multiplied by the distance flown in kilometers.
PRTR	Pollutant Release and Transfer Register: PRTR is a law for managing and reporting emissions of specified chemical substance into the environment.
R-NAV	Area Navigation: Conventional aircraft navigation in airspace is based on the use of ground-based navigation aids (i.e. VOR/DME/NDB) and the resultant ATS route structure is anchored on these point source aids, being totally dependent upon the location of the ground facilities. R-NAV - a method of navigation which allows aircraft to operate on tracks joining any two points, within prescribed accuracy tolerances, without the need for the over flight of specific ground facilities. R-NAV is a method of navigation which permits aircraft operations on any desired flight path within the coverage of station referenced navigation aids or the limits of the capability of self-contained aids, or any combination thereof.
RVSM	Reduced Vertical Separation Minimum: The goal of RVSM is to reduce the vertical separation above flight level (FL) 29,000-ft from the current 2000-ft minimum to 1000-ft minimum. This will allow aircraft to safely fly more optimum profiles, gain fuel savings and increase airspace capacity.
SO2	Sulphur Dioxides Formed in combustion of fossil fuels: A colorless gas produced through the burning of fossil fuel containing sulfur. SO2 has an acid odor that is toxic when inhaled in large quantities, and also may cause acid rain. SO2 occurs in the aerosol form, and therefore helps to prevent global warming by diffusing sunlight. Jet fuel contains a minute proportion of sulfur, accordingly causes only minor emissions of this substance.
SOx	Oxides of Sulphur
SPM	Suspended Particle Matter: Particles of size less than 1/100 mm in diameter that has an ability to remain suspended in the air for hours. These are causes of many breathing problems.
SST	Super Sonic Transport
VOC	Volatile Organic Compound: Emitted during incomplete combustion of fossil fuels. In aviation emitted when the engine is run at low speed and the temperature in the combustion chamber is low. Also includes all types of solvents that evaporate from detergents and paints. These can initiate various chemical reactions when diffused in the air.
WECPNL	Weighted Equivalent Continuous Perceived Noise Level: It is generally referred to as a "high level of aircraft noise" and is units showing the level of aircraft noise per day at one point. The calculations are made considering noise level per aircraft, hours of flying and number of flights. In the Environmental Standard for Aircraft Noise, the level WECPNL 70 or lower is applied to residential areas and WECPNL 75 or lower to non-residential areas where normal living level is to be maintained.

ANA Group Environmental Data

Since last year, we have been collecting and sharing information about various environmental data. This year we expanded the contents and published the *ANA Group Environmental Data Book*; in the future we will continue to expand the scope of environmental data and disclose information. Please refer to the report of 2003 and judge for yourself about how ANA performed for both the environment and our society.

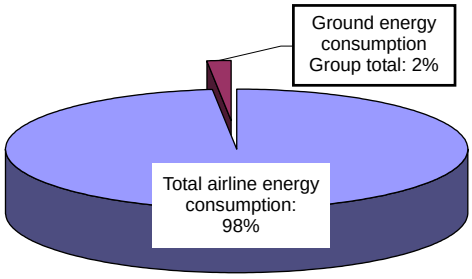
Aspects of ANA Group

Energy consumption

Because ANA group is a company that performs mainly air transportation service, our major source of energy (98% of total consumption) is aviation fuel. Meanwhile, the rest is generic energy that amounts to the equivalent of 50,000 kiloliters of crude oil. Specifically, 3/4 of the non-fuel generated energy consumption is electrical power consumption (approximately 140,000,000 KWH). This equals to approximately half of the total annual power consumption at the major private railway in Tokyo.

Energy consumption (crude oil equivalent)

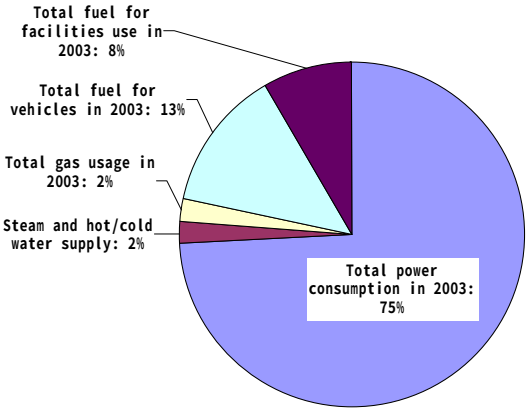
Group's total consumption 3,140,000KL- crude oil



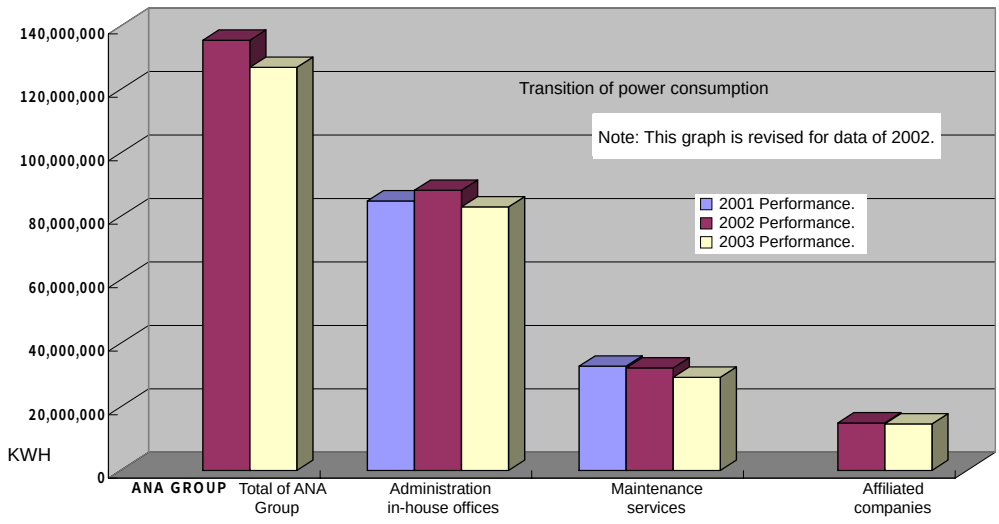
Aviation fuel comprises 98% of the total energy consumption.

Ground energy consumption (crude oil equivalent)

Group's total consumption 49,216KL- crude oil



3/4 of ground energy consumption is electricity consumption.

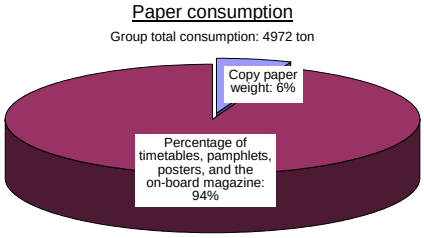


Total power consumption at our business center dropped over the previous year.

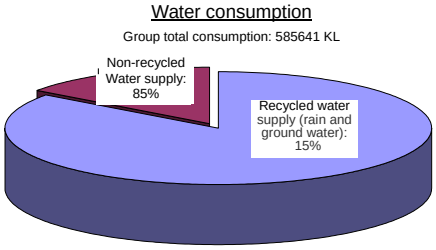
Paper consumption

Approximately 5,000 tons of paper was consumed by ANA group, 94% of which was used for business operation activities such as publishing timetables, pamphlets, posters, and the on-board magazine.

Meanwhile, percentage of paper used for photocopy in our offices was 6% of the total consumption, approximately 300 ton. This is a considerable amount 70% of which was recycled paper.



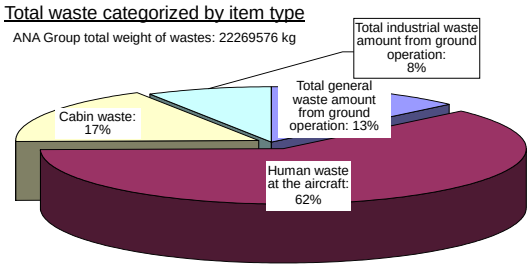
Over 90% was used for operating activities such as publishing timetables, pamphlets, posters, and on-board magazine.



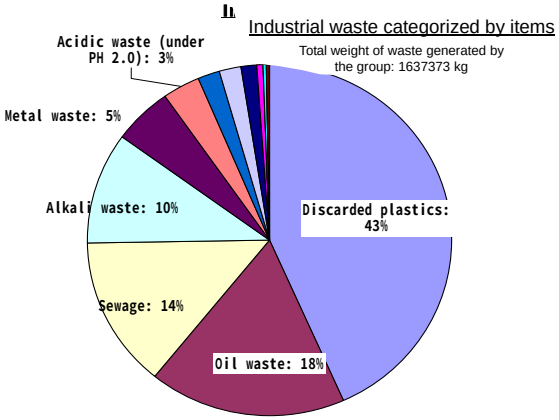
15% of total water consumption was provided by rain and ground water.

Amount of industrial waste

We produced approximately 20,000 ton of total waste, 80% of which came from aircraft operations (toilet sewage and cabin garbage). The rest of the waste came from ground operations, approximately 4% of which was discarded plastic when categorized by item type. Therefore, our goal is to reduce the total amount of cabin waste and discarded plastic.



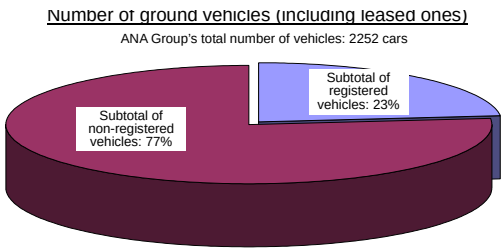
80% of total waste generated was cabin waste (includes human waste). Industrial waste was 8% of the total amount.



The largest weight of industrial waste was discarded plastic which was 4% of the total weight.

Number of ground vehicles

Approximately 2,200 vehicles (including leased ones) are in operation at ANA group companies; this number also has a big effect on the environment. Approximately 80% of the total vehicles are non registered vehicles, mainly ground handling cars and cars used at the limited areas at various airports. The number of non registered vehicles is considerably higher when compared with other corporations.



Listed above are the main environmental characteristics of ANA Group, there is a common thread tying these problems together, but these problems are applicable to the nature of the airline operation throughout the industry. The numbers above are presented from the environmental point of view; they demonstrate the scope of ANA group's business activities such as conveying information to customers (timetables, posters, and on-board magazine), aviation operations (aviation fuel), flight operation support (ground handling) and waste disposal after flights. We will continue to apply more efforts to achieve our goals as stated in the ecology plan (2003-2007).

ANA Group Environmental data (Fiscal year 2003)

					ANA group	ANA Internal	Unit	Ratio over the previous year
Ozone depletion		Halon and Fluorocarbons	Aircraft	Specified CFC	0	0	kg	0%
				Halon present in fire extinguishers	16.816	16.108	kg	102%
				Amount of discharge	0	0	kg	100%
Water-re sources	Depletion of water sources	Building use		Total amount of water use	585.641	384.411	ton	108%
				Waterworks	497.402	320.29	ton	
				Recycled water	88.239	64.121	ton	
				Rate of recycled water use	15%	17%		
	Water pollution	Building use		Total amount of waste treatment	45.967	24.647	ton	66%
				Industrial waste	42.971	21.651	ton	
				Cafeteria waste	2.996	2.996	ton	
		Aiplane use for de-icing		Total amount	1.543	1.543	KL	148%
Eco-system related environmental issue				The amount of PCB storage	4.375	4.258	kg	100%
Grobal warming	Deforesta tion	Paper consumption		Total amount of paper consumption	4.972	4.867	ton	
				Total amount for paper for photocopies (purchased)	66.803	45.972	1000 sheets(A4 size conversion)	98%
				Amount of recycled paper for photocopies	47.147	43.144	1000 sheets(A4 size conversion)	
				Ammount of pulp paper for photocopies	19.656	2.828	1000 sheets(A4 size conversion)	
				Percentage of recycled paper use	71%	94%		
				Total of other paper (posters and panphlets)	4,688	4,672		
	Energy	Total of crude oil equivalent		Aircraft energy consumption	3,053.55	2,667.31	crude oil KL	
				Ground energy consumption	49,216	44,127	crude oil KL	
		Fuel consumption	Aircraft	Total consumption	3,180,777	2,778,448	kl	99%
				consumption per seat-kilometer	3.66	3.63	l/100ASK	100%
			Vehicles	Total of vehicle fuel consumption	6,654	2,707	kl	131%
				Diesel	6,242	2,450	kl	
				Gasoline	412	257	kl	
			Buildings	Total of facility fuel	4,211	2,707	kl	102%
				Heavy oil	1,231	575	kl	
				Light oil	1	0	kl	
				Kerosene and others	2,979	2,978	kl	
				Total gas consumption	912,883	519,895	m^3	
				City gas	899,568	519,895	m^3	182%
				Propane gas	13,315	0	m^3	
				Energy supply	25,932,799	25,514,631	MJ	
		Power consumption	Buildings	Electric power	137,803,454	121,815,832	kWh	102%
	Air pollution	Exhaust	Aircraft	Number of aircraft	180	144	Aircrafts	103%
			Vehicles	Number of moter vehicles	2252	807	Cars	117%
				Number of low-emission vehicles	130	49	Cars	
				Ratio of low-emission vehicles	6%	6%		
		Carbon dioxide (CO2) emissions	Total		791.8	692.4	10,000ton-CO_2	
			Aircraft	Total amount of CO2emissions	783.7	684.6	10,000ton-CO_2	99%
				Amount of emissions per seat-kilometer	90.08	89.42	g-CO^2/ASI	100%
			Ground equipment and vehicles	Total amount of emissions	8.1	7.8	10,000ton-CO_2	
		Carbon (C) emissions	Total		216	189	10,000ton-C	
			Aircraft	Total amount of carbon emissions	213.8	186.7	10,000ton-C	
				Amount of emissions per seat-kilometer	24.57	24.39	g-C/ASK	
			Ground equipment and vehicles	Total amount of emissions	2.2	2.1	10,000ton-C	
		Nitrogen oxide (Nox)	Aircraft	Amount of emissions in LTO cycle	0.66	0.55	10,000ton-Nox	
		Hydrocarbon (HC)	Aircraft	Amount of emissions in LTO cycle	0.11	0.10	10,000ton-HC	
		Carbon monoxicide (CO)	Aircraft	Amount of emissions in LTO cycle	0.63	0.54	10,000ton-CO	
		Fuel dumpling for emergency landing	Aircraft	Total amount of fuel dumping	335	335	kl	174%
				Number of fuel dumping occurrences	4	4	times	100%
Waste		Total amount of waste			22,269,576	21,122,766	kg	259%
			Aviation operations	Total amount of cabin wastes and sewage	15,482,512	15,138,919	kg	357%
			Ground operations	Ground total waste	4,212,219	3,521,110	kg	101%
				Sub total of general waste	2,574,845	2,462,736	kg	
				Sub total of industrial waste	1,637,374	1,058,374	kg	

The data shows ANA and the ANA group companies (Air transportation, Maintenance, Ground handling, Vehicle maintenance, etc) results in the 2 fiscal year 2003. May not include data for all ANA group companies.

[Conclusion]

The 1st annual "My Blue Sky" International Environmental Picture Book Contest, *Watashino Aozora*

For the 1st international Environment Picture Book Contest, *Watashino Aozora,* we started inviting entries in June until August. We were pleased to receive many student entries at the end of the summer. There ware also many entries from all over the world; England, France, Germany, Belgium, Italy, Finland, America, Canada, Singapore, Indonesia, Thailand and Japan. Through the use of color schemes, the many entries from Asian countries and Okinawa were able to show the unique national character of that country/location. There was also wide rage in the age of those participants, ranging from 7 years old to 78 years old; the total number of the entries was well over 400, with 3/4 of all entries coming from women. The theme of this contest was nature and environment. We reaffirmed our recognitions of the environmental issues by trying to understand people's thoughts through their entry. There were lots of heart warming entries from the parents-child joint entries as well. In the end of September, we had the first screening of entries with the help of teachers from kindergartens in Ota ward, Tokyo. The followings are some of the teachers' impressions about the entries and their themes: creatures, environment and recycling.

- We assume that many pictures are influenced by parents concerns and school activities in classrooms.
- Many pictures are drawn based on child's individual experience.
- From many pictures, we can see that many people seriously care about nature and environment.

After the final selection in the end of November, we made 100,000 copies of the first prize picture and distributed it on our aircraft and to educational institutions. We also framed the first prize picture as well as another 20 pictures to exhibit at many local communities. We greatly appreciate the many contributions for this contest.

Front cover

First Prize

"A thought for the forest"

Azuma Kusakado

Front cover

Grand Prix

Entry from America

"Mottainai"

Aoi Takama

ANA's CSR

The total energy consumption of ANA group was equivalent to 3,140,000 KL of crude oil, of which 98% was used in aviation operations. Regarding the switch to the most advanced aircraft, which was the main reason for better control of CO2 emission, we became the first Boeing 7E7customer in July. Our total paper consumption was approximately 5000 ton and over 90% of that consumption was essential use for business activities such as publishing timetables, the on-board magazine and posters. We make every effort to recycle as much as possible. We have started planting trees and corals around airports with the goal to reduce CO2 emissions and landscape national lands. The main theme of this report is environment; by producing various publications such as the on-board magazine "Wing Span", as well as the "Flight Safety" and "IR report", we provide information on flight safety and various regulations compliance.

ANA will keep working hard to be seen as a sincere company for our society.

<Editors' note>

Thank you very much for reading ANA group's "Environmental report". Although, we changed the name of the department that publishes it, the report title remained as it was. Even though we have to generate this report with small staff due to several restrictions, we will keep putting more efforts in order to respond to our customer's needs. We would appreciate your suggestions in future. The editing staff.

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The summary of this report and other topic are available on ANA homepage
(From http://www.ana.co.jp -> Corporate Profile -> Safety and Environment)


This report is printed with soy ink. Paper for front cover is produced from deccan hemp, not from any wood products, and paper for inside pages is 100% of recycled paper. Printing system without water and harmful water waste.