

Climate Change

For FY2007, under its Ecology Plan, the ANA Group has set the goal of reducing CO₂ emissions per available seat km to 12% of FY1990 levels. In FY2006, we achieved reduction very close to our target of 12%, resulting in 8.19 million tons* of CO₂ emissions, 98% of which resulted from the combustion of jet fuel. By upgrading our fleet to the latest aircraft, and by performing optimal engine maintenance, among other measures, we are working hard to achieve our FY2007 goal.

*Ground energy included

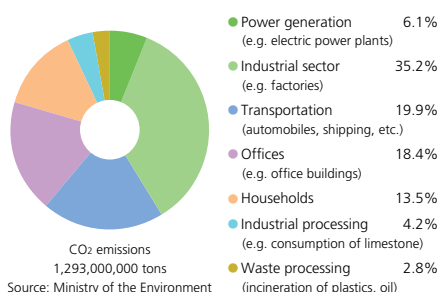
Aviation and Climate Change

Aircraft engines run on fossil fuels, which through combustion produce emissions of mainly CO₂ (carbon dioxide), NO_x (nitrogen oxides) and H₂O (water vapor). In particular CO₂ accounts for 95%* of greenhouse gas emissions in Japan. But we produce greenhouse gases not only by oper-

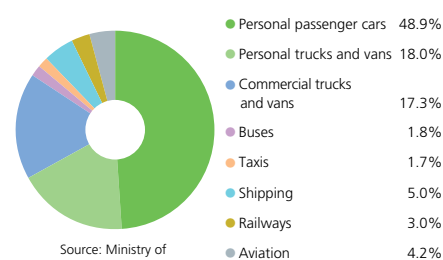
ating aircraft, but also in maintaining them and even in doing the paperwork.

In FY2005, the transport sector accounted for some 20% of all industrial CO₂ emissions. The share of CO₂ emissions from domestic aviation in Japan was about 4.2% of all transport sector emissions.

CO₂ Emissions in Japan by Sector (FY2005)

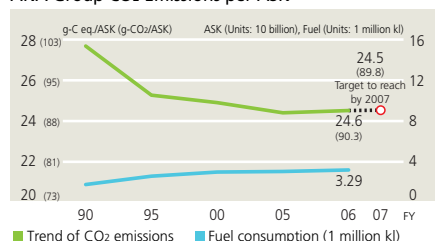


CO₂ Emissions in Japan's Transport Sector (FY2005)



Reduction of CO₂ Emissions from Jet Fuel

ANA Group CO₂ Emissions per ASK



CO₂ Emissions

There is currently no substitute for fossil fuels available to the aviation industry, so we must curb CO₂ emissions by improving fuel efficiency.

In the climate change measures outlined in the ANA Group Ecology Plan, we set the goal of reducing CO₂ emissions per available seat km by 12% from FY1990 levels by FY2007, and we have been implementing various activities to that end. The ANA Group's CO₂

emissions from aviation activities were 8.11 million tons in FY2006, up 4.4% from the previous year due to business expansion. CO₂ emissions per unit production (available seat km) became 24.6g-C (90.3g-CO₂), still about 12% lower than in FY1990, our benchmark year.

Although the number of seats in service increased significantly from FY1990 due to higher demand, the CO₂ emissions per ASK decreased.

ATK (Available Ton Kg) CO₂ Emissions by Cargo Fleet

The ANA Group has been operating a dedicated cargo fleet on international routes since FY2002. ATK CO₂ emissions from this operation are as follows:

Aircraft type	FY2002	FY2003	FY2004	FY2005	FY2006
B767-300F	479	446	439	439	413

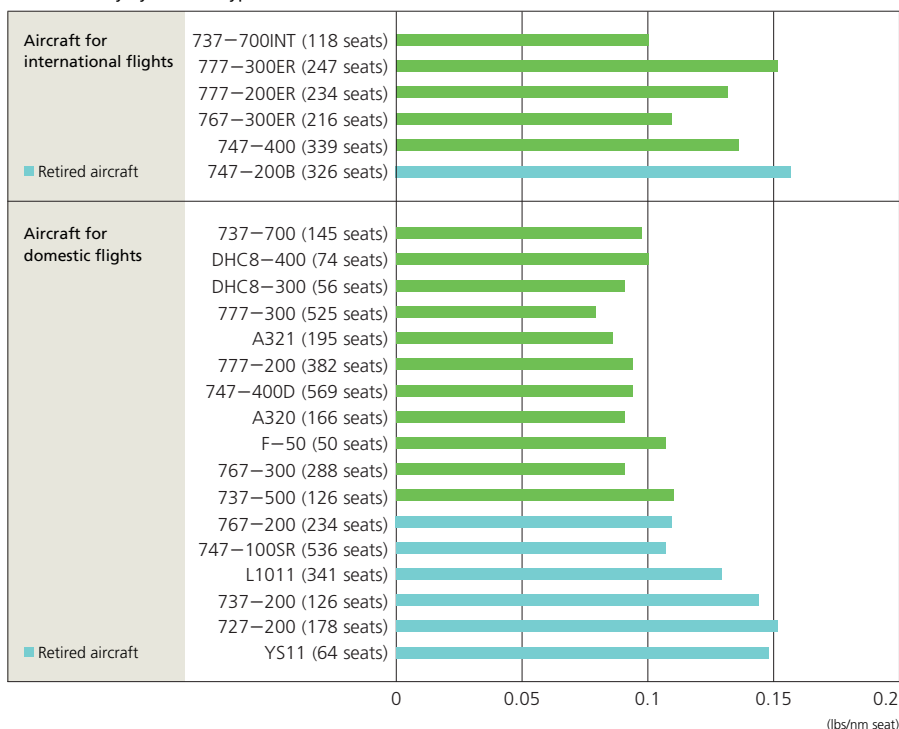
(g-CO₂/ton km)

Fuel-Efficient Aircraft

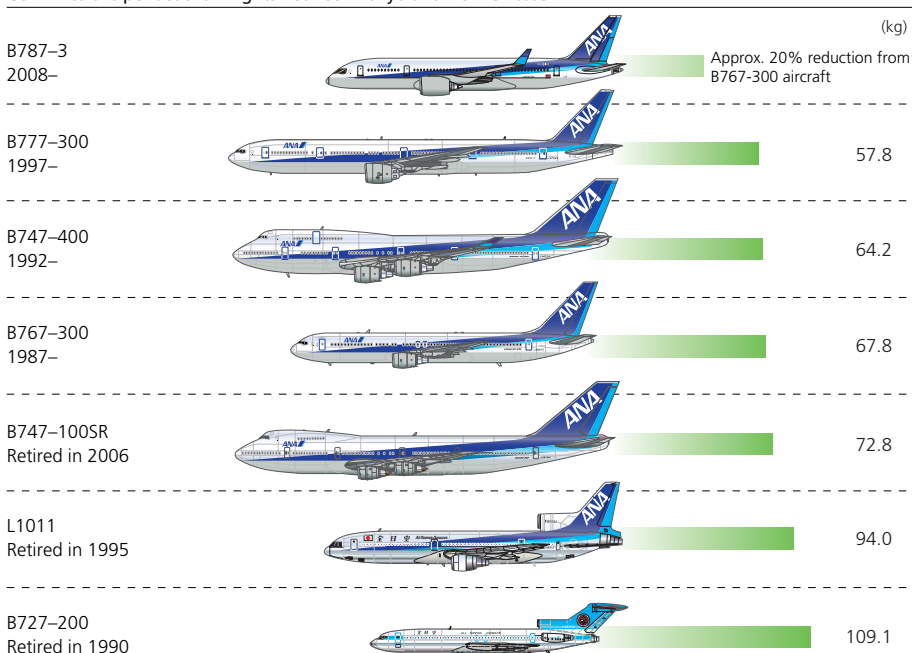
Reducing CO₂ emissions boils down to reducing fuel consumption. The most effective methods are: (1) introducing fuel-efficient engines with the latest technologies; (2) reducing air resistance through improved wing designs; and (3) reducing fuselage weight through the use of composite materials. The Boeing 787 employs all of these methods, and ANA was its first buyer in July 2004, ordering 50 of them. The 787 is expected to reduce fuel consumption by 20% compared with the current 767-300.

Fuel efficiency achieved by utilizing the latest aircraft is shown on the right chart.

Fuel Efficiency by Aircraft Type



CO₂ Emissions per Seat for Flights Between Tokyo and New Chitose





■ Reducing the Environmental Burden

As lower fuel consumption directly leads to a reduction in greenhouse gas emissions, we consider this an important goal for an air transportation company. Since the oil crises of 1973 and 1979, the ANA Group has been developing and implementing fuel-saving measures. Here are some recent examples.

EFP promotion project

The ANA Group started the EFP*¹ promotion project in FY2003. EFP increases fuel efficiency by optimizing the altitude and speed of flight plans, while considering weather conditions and air traffic control information, and by informing flight crew of the most fuel-efficient point to initiate descent at each airport.

We monitor the amount of fuel saved each month; in FY2006 we saved 5,200 kilolitres, a great reduction from the previous year. This represents the amount of fuel required by a Boeing 777-200 to make 330 round trips between Tokyo and Osaka. In FY2007 we are working to reduce fuel con-

sumption even further through various measures.

*1 Efficient Fuel Program

Taxiing after landing with some engines shut down

To conserve fuel, since 1994 the ANA Group has been stopping some engines when taxiing. The decision of whether or not to shut down engines is made after taking into account the airport, weather, condition of runway and aircraft, and instructions from the control tower.

Restoring engine performance by washing the compressor

The more an engine is used, the more dust particles stick to its compressor and degrade performance. To improve fuel efficiency, in FY2003 the ANA Group began regularly washing compressors to optimize engine performance.

As a result of washing 4.5 times more than in FY2005, some 17,000 kiloliters of fuel was saved in FY2006—equivalent to 1,070 round trips between Tokyo and Osaka on a Boeing 777-200.



Washing the engine compressor

Prioritized use of Ground Power Units

As an environmental preservation measure, ANA has been attempting to reduce its reliance on APUs*² since 1990. APUs are less energy efficient than ground power units (GPUs) as they burn onboard fuel; we thus prioritize the use of GPUs. In FY2006, this strategy saved 36,000 kiloliters of fuel—enough for a Boeing 777-200 to make 2,250 round trips between Tokyo and Osaka.

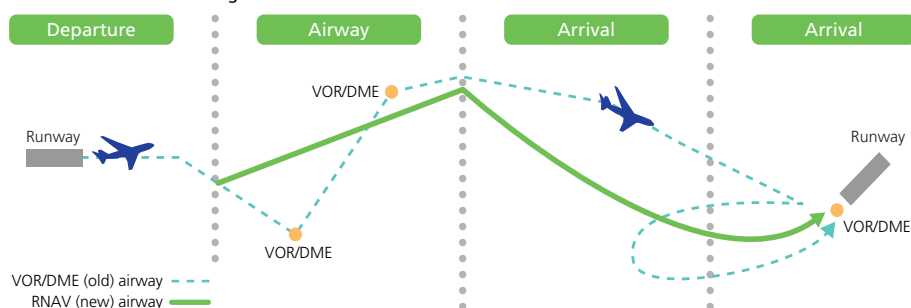
*2 Auxiliary Power Unit: small on-board gas turbine that provides electricity as well as pneumatic pressure for engine ignition and cabin air conditioning



Pre-flight briefing

■ Reducing the Environmental Burden

RNAV and Conventional Flight Path



Operation with RNAV (Area Navigation)

The ANA Group officially adopted RNAV (Area Navigation) in June 2002. RNAV is a procedure that navigates aircraft and assures the scheduled flight path by radio-guidance facilities such as DME (Distance Measuring Equipment) as well as by satellite and onboard equipment. Not only does RNAV achieve faster and shorter flights while reducing fuel consumption and engine exhaust, it also reduces noise around airports during the night. The ANA Group aims to expand the use of RNAV both in Japan and overseas.

Saving fuel through simulators

The ANA Group's use of flight simulators to train and evaluate flight crew reduces fuel consumption and noise and helps us make the most of limited space. We introduced the devices back

in 1971, when the Civil Aviation Bureau approved the YS-11A flight simulator as a replacement for actual-flight training. Since then, due to relaxed regulations governing flight training and evaluation, and also due to improvements in simulators, almost all flight training and evaluation now takes place in simulators; the devices are also used for maintenance training and evaluation.

In FY2006, total simulator use—for training and evaluation of both flight and maintenance crews—amounted to 55,277 hours. If these hours had been actual flight time, they would have required 340,000 kiloliters of fuel (740,000 tons of CO₂). This equals 10.5% of all aircraft fuel used at the ANA Group in FY2006, or 22,000 round trips between Tokyo and Osaka by a Boeing 777-200. The ANA Group will continue to take full advantage of flight simulators.

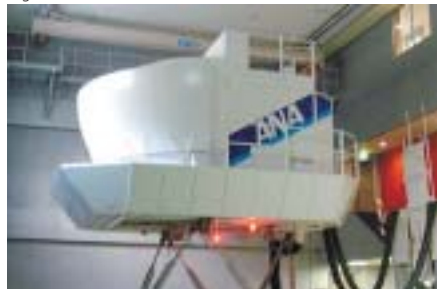
Reduction of ground energy consumption (excluding aircraft)

ANA has participated in "Team Minus 6%," Japan's national global-warming prevention project promoted by the Ministry of the Environment. Measures we have enforced include setting air-conditioners to a higher temperature in summer (and lower one in winter), and encouraging employees to use the stairs instead of elevators.

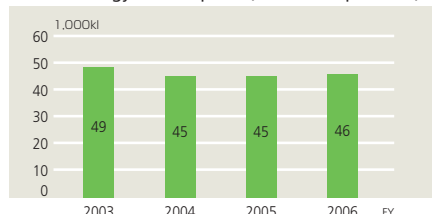
The ANA Group's energy consumption can be broken down into aircraft (98%) and ground requirements (2%). In crude-oil equivalence, our ground energy in FY2006 was 46,000 kiloliters, or approximately half of the annual power consumption at a major private railway company in Tokyo. Ground energy consists of electricity (75%), automobile fuels, heavy oil, and fuels for heating facilities.

After an amendment to the Energy Conservation Law took effect in April 2006, we took the Ministry of Economy, Trade & Industry designated energy-conservation diagnostic check in the categories of Class 1 Business Site (3,000 kiloliters' crude-oil equivalent energy consumption) and Class 2 Business Site (1,500 kiloliters); the outcome was that reducing energy consumption through conventional methods was not an option. At this time we formulated a 10-year construction plan for energy-

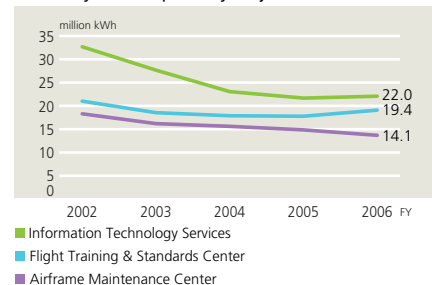
Flight simulator



Ground Energy Consumption (crude oil equivalent)



Electricity Consumption by Major Offices





saving facilities aiming for an average 1% reduction per year.

Weight reduction measures

Introduction of lightweight cargo containers

The ANA Group introduced 200 lightweight containers for international routes in October 2006. These containers, composed mainly of Kevlar®* (excluding the base and frame) and canvas (opening), are some 28 kg lighter than standard types.

On the Narita–San Francisco route, where they are used mainly, up to 1,232 kg is saved per Boeing 777-300. This represents a potential reduction of 495 liters, or approximately 2.5 fuel drums (1,220 kg of CO₂), each way on the Narita–San Francisco route. The ANA Group currently has 600 of these containers in operation.



New lightweight container

Container Material and Weight Comparison

	Lightweight	Standard
Material	Kevlar® 70%	Aluminum 100%
	Canvas 5%	
	Aluminum 25%	
Weight	71kg	99kg

* Kevlar® is a registered trademark of DuPont U.S.A.

Reductions at ANA Catering Service

ANA Catering Service is working to save weight by gauging beverage consumption to determine the amount of water required onboard, and by switching to lighter plates.

Since June 2007 the amount of water onboard has been reduced, and the weight of dishware reviewed on Japan-outbound Boeing 777-300ERs. Meanwhile, by changing loading procedures for long-haul routes on the Boeing 777-300ER, two half-sized-carts full of goods, weighing some 80 kg in all, were not loaded.

Further, a switch to lighter plates is being promoted. On the Boeing 737-700ER ANA BusinessJet, inaugurated on the Narita–Mumbai route in September 2007, only lightweight plates are used. And since June 2007, hard liquor has been served in smaller bottles, saving an average 300g per cart.



Lighter plates



ANA BusinessJet