

2 The Environment

JAL Group promotes "Sky Eco" for a Greener Tomorrow.

Our Eco-First Commitment

In 2010, the JAL Group made an "Eco-First" commitment to renew its efforts for preserving the global environment and received certification as an "Eco-First Company" from the Ministry of the Environment of Japan.



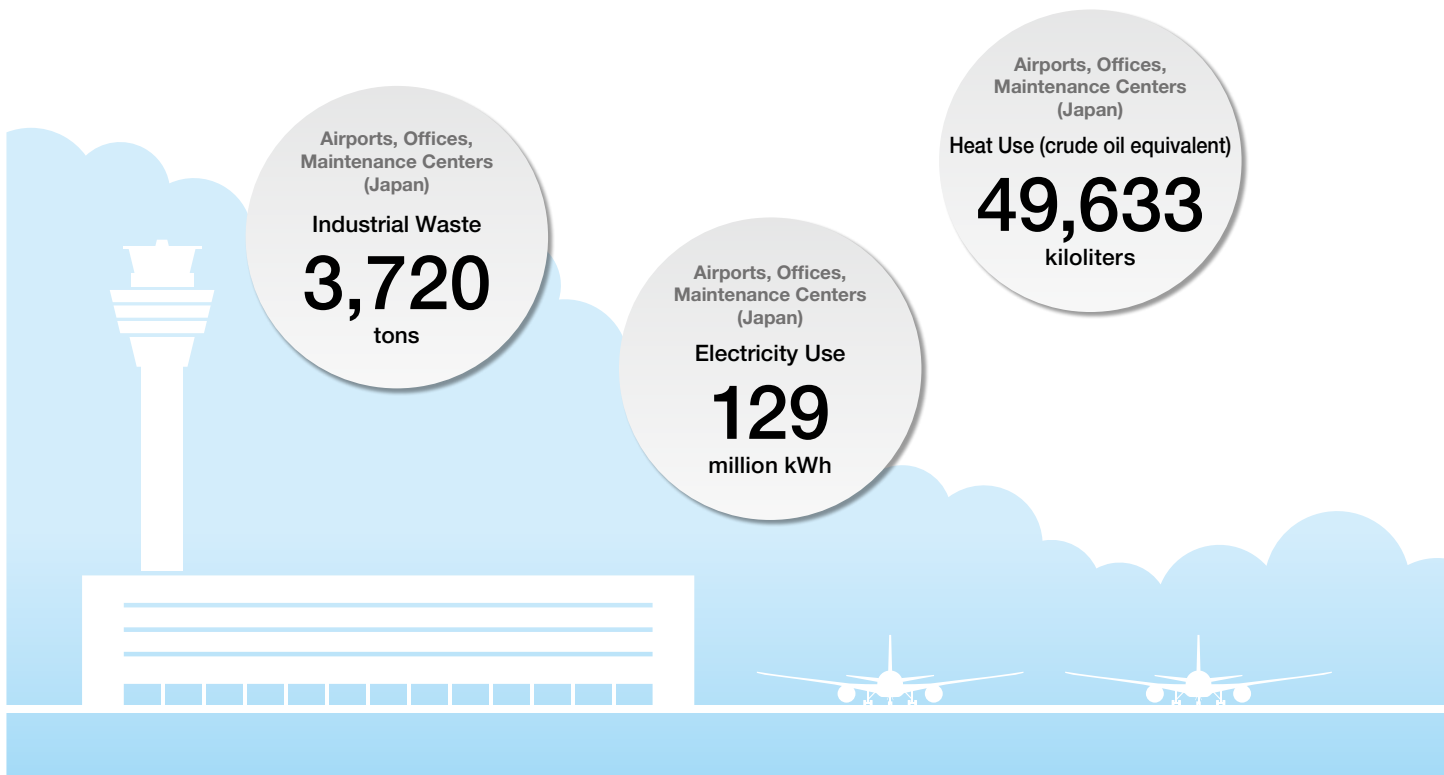
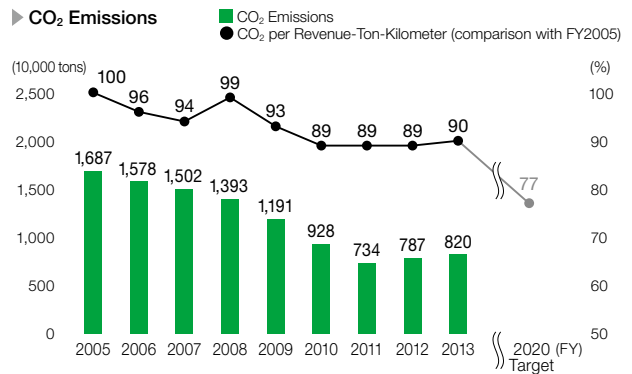
Environmental Guidelines

As an airline transportation company that is an important social infrastructure, we are conscious of the fact that we have a responsibility to the global environment, and as such, the JAL Group has placed the control of our environmental impact and the protection of the environment as core themes in our business operations, as we continue to implement "Sky Eco," so we will be able to pass this rich earth on to the next generation and they will always be able to see the beautiful earth from the sky.

CO₂ Emissions by JAL Group Aircraft

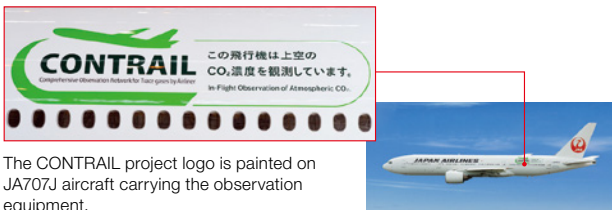
In FY2013, CO₂ emissions by JAL Group aircraft per unit transport volume (revenue-ton-kilometer) were reduced by 10.4% compared to the FY2005 level. CO₂ emissions per unit transport volume were slightly higher because our introduction of new aircraft, such as the Boeing 787, improvements to flight operations efficiency, and regular engine cleaning for more efficient fuel consumption did not do enough to offset the loss in efficiency from equipping aircraft with fewer seats on long-distance flights to enhance passenger comfort.

Total CO₂ emissions increased by 330,000 tons from the previous fiscal year as a result of expanded operations.



CONTRAIL Atmospheric Greenhouse Gases Observation Project by Passenger Aircraft

The JAL Group has been participating in the “CONTRAIL Atmospheric Greenhouse Gases Observation Project by Passenger Aircraft” as an environmental effort that can only be implemented by airline companies. This joint project with Japan’s National Institute for Environmental Studies, the Meteorological Research Institute, JAMCO Corporation and the JAL Foundation, marked its 20th anniversary in 2013. Eight Boeing 777-200ER aircraft in our fleet, two of which bear the CONTRAIL project logo, have been modified to allow for the installation of air sampling equipment (ASE and CME) that can measure atmospheric CO₂ and other greenhouse gases and are now being used for atmospheric observations. The project has been widely recognized as a pioneering collaboration between industry, government and academia, and received the “Environment Minister’s Award” and “Environmental Excellence Award” under the 40th Environmental Awards for FY2013, sponsored by the Hitachi Environment Foundation, as well as the “Japan-South Korea International Environment Award,” sponsored by The Mainichi Newspapers Co., Ltd. and other organizations.



The CONTRAIL project logo is painted on JA707J aircraft carrying the observation equipment.

VOICE



Enjoying the Challenge of Participating in a Global Project

Yuki Nakajima
 Mechanical System Group
 Technology Department
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With respect to the CONTRAIL project, the Technology Department makes plans and adjustments every month, based on requests from researchers and flight schedules, as it determines the optimal routes and installation timing for observation equipment on aircraft. We provide technical support for modifying airframes to enable installation of observation equipment and support for obtaining approval from airline authorities in the U.S. and Japan, and during servicing operations, while also handling any problems that arise during the modification process. We work under considerable pressure, since the entire process must be carried out within a limited period, which makes it all the more satisfying when the work is completed without a hitch.

As an airline engineer, participating in the globally acclaimed CONTRAIL project is very rewarding. I hope to make the best use of my skills on this and other projects as my contribution to environmental efforts that can only be accomplished by an airline company.

Airports, Offices,
 Maintenance Centers
 (Japan)

Water Use

452

thousand m³

Aircraft in Flight
 (Japan, International)

CO₂ Emissions

8.2

million tons

Action Plan

We have placed the control of our environmental impact and the protection of the environment as core themes in our business operations, and create action plans for these areas. Our philosophy and dedication toward them are set out in the "Action Plan."

Action Plan 1 We actively conduct initiatives to prevent global warming.

| Commitment | Status |
|--|---|
| We are working to reduce CO ₂ emissions per revenue-ton-kilometer from JAL Group aircraft by 23 percent in 2020 as compared to 2005 level. | <ul style="list-style-type: none"> CO₂ emissions per revenue-ton-kilometer for FY2013 declined by 10.4 percent from FY2005 level. We did not achieve our target of 1.5 percent average annual improvement (average figure for FY2005 to FY2013), falling short by 0.2%, since aircraft modifications to enhance passenger comfort by installing fewer seats reduced efficiency. |
| We are upgrading our fleet to lower fuel consumption and low noise aircraft (e.g., Boeing 787, 737-800 and Embraer 170). | <ul style="list-style-type: none"> We introduced 12 aircraft with reduced fuel consumption (787-8, 737-800 and E170) and retired four aircraft (767-300 and 737-400). We implemented a series of performance improvement modifications on 777-200ER aircraft and finished attaching winglets (small drag-reducing attachments at the tip of a plane's wing) on six 767-300ER aircraft. |
| We are conducting "Eco Flights." | <ul style="list-style-type: none"> We achieved annual reductions in CO₂ emissions of approximately 45,000 tons, mainly through implementing 5 "Eco Flight" activities: engine out taxi, idle reverse, reduced flap, delayed flap and delayed gear. |
| We are endeavoring to reduce weight. | <ul style="list-style-type: none"> We started using 480 of the world's most advanced cargo containers, which are approximately 40% lighter than conventional units. |
| We are cutting CO ₂ emissions by washing engines and pursuing other methods of CO ₂ reduction. | <ul style="list-style-type: none"> We implemented engine water washing at intervals of 190 days to 270 days for the 777 aircraft, 767 aircraft and 737-800 aircraft. Result: Annual CO₂ emissions were reduced by approximately 22,000 tons. Reduction in APU (auxiliary power unit) usage time for 777 aircraft and 737-800 aircraft was nearly equal to last year's reduction. |
| We work together with the associated ministries and aviation authorities such as air traffic control in various countries to introduce leading methods for fuel efficient aviation, and will actively continue to do so in the future. | <ul style="list-style-type: none"> We obtained certification for reduced environmental impact for the flight operations methods adopted on our Haneda-San Francisco route. Estimated reduction in CO₂ emissions: around 660 tons per year (see page 43). We have been implementing CDO (continuous descent operations) at San Francisco International Airport and Kansai International Airport. We have been operating UPR (user preferred route) on flights to Hawaii, Australia, the West Coast of North America (Los Angeles, San Francisco and Vancouver) and Palau. Efficient selection of alternative airports (alternatives for HEL and DEL) Estimated annual reduction in CO₂ emissions as a result of the above efforts: around 5,000 tons. |
| We are collaborating in the research and development of aviation biofuel made from inedible plants. | <ul style="list-style-type: none"> We conducted a biofuel demonstration flight in January 2009 and have been exploring the feasibility of using biofuel on commercial flights by exchanging information with the ICAO, IATA, related authorities, manufacturers, research institutions and universities. We are participating as a leading member of the Initiative for Next-Generation Aviation Fuels (INAF) to create a roadmap for developing biofuel processed in Japan. We are planning an aggressive effort as part of an all-Japan team of industry, government and academia to realize the full-scale introduction of biofuel by around 2020 (the year of the Tokyo Olympics) at major airports. |
| We promote energy saving activities in our ground facilities (offices, factories, etc.). | <ul style="list-style-type: none"> We continued to consolidate maintenance facilities, conducting various energy-saving activities and upgrading to electricity-saving lighting in our offices. |

Action Plan 2 We actively promote social and environmental activities and environmental awareness activities.

| Commitment | Status |
|--|--|
| By continuing to conduct environmental and social activities, we are able to contribute to long-term conservation of the environment, and we strive to improve the environmental awareness of children who will lead the next generation, as well as all of society and our own employees. | <ul style="list-style-type: none"> Our flight crew took the initiative to derive and put into practice organizational solutions for environmental problems in the area of flight operations. Initiatives include Sky Eco Project activities and environmental awareness seminars (Sky Eco classes) offered by captains for children (32 times in FY2013). We contributed to reducing CO₂ emissions with cooperation from passengers by implementing the "Shades Closed Exercise" and improving on-time performance (currently the world's top). |
| We will continue to participate in the atmosphere observation project and the forest fire reporting project using our aircraft. | <ul style="list-style-type: none"> We have been participating in the "CONTRAIL Atmospheric Greenhouse Gases Observation Project by Passenger Aircraft" (see page 41). We have been participating in the "Siberian Forest Fire Reporting Project." Since 2003, pilots have been reporting any fires detected during summer flights over Siberia to a research team led by Hokkaido University in a cooperative research effort on early fire detection by satellites (199 fires were reported in 2013). |

Action Plan 3 We work toward the realization of a recycling-based society and for the preservation of the environment.

| Commitment | Status |
|--|--|
| Ultimately we are aiming for a disposal rate of less than 2% for industrial waste from domestic worksites. | <ul style="list-style-type: none"> Despite increased waste emissions related to facility reorganization and aircraft seat modifications, total waste volume in FY2013 was reduced by 14% from FY2012. The final disposal rate was 1.2%, achieving our target of less than 2%. |
| We work to reduce water usage. | <ul style="list-style-type: none"> Water use was reduced through facility reorganization and reuse of wastewater. |
| We work to reduce the amount of emissions of chemicals (governed by the PRTR Act). | <ul style="list-style-type: none"> While little room remained for further reductions, as we had already introduced maintenance materials with less impact on the human body and the environment, use of trichloroethylene increased significantly in line with increased maintenance operations. As a result, the total volume of PRTR substances handled in FY2013 (462 chemicals) increased 7% year-on-year to 66 tons. (Total volume of PRTR substances except for trichloroethylene (461 chemicals) decreased 15% year-on-year to 29 tons.) |
| We work to recycle uniforms and items used in aircraft cabins such as in-flight magazines, newspapers, aluminum cans, plastic bottles and cargo packing materials. | <ul style="list-style-type: none"> We actively recycled beverage cans, newspapers, in-flight magazines and plastic bottles. We are promoting comprehensive efforts to dispose of in-flight waste in collaboration with IATA and airport companies. Total amount of recycled waste in FY2013: 2,540 tons including 180 tons of recycled fiber as a result of updating the design of uniforms. |

Action Plan 4 We work to conserve the environment around airports.

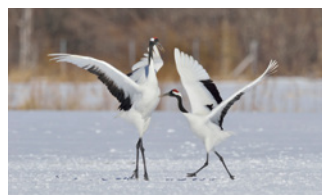
| Commitment | Status |
|--|--|
| We actively introduce low-noise aircraft and noise abatement operational procedures, and respond to other airport noise issues. | <ul style="list-style-type: none"> • We actively practice "Reduction of Noise at Source" and "Noise Abatement Operational Procedures" as responsibilities of airlines under the "Balanced Approach" recommended by the ICAO. All JAL aircraft are compliant with ICAO Chapter 4, the most stringent standard for noise. • Under the "Noise Abatement Operational Procedures," we practice noise abatement procedures at takeoff and operate under more stringent rules when taking off from Tokyo International Airport (Haneda) and Osaka International Airport (Itami). • As for noise abatement procedures upon landing, we practice reduced flap, delayed flap and idle reverse. At San Francisco International Airport and Kansai International Airport, we conduct CDO (continuous descent operations) to significantly reduce both noise and CO₂ emissions. |
| We work to reduce NOx emissions from aircraft, automobiles, etc. (NOx, HC, CO and other aircraft engine emissions are strictly regulated by the ICAO. Similar restrictions have been established under Japan's Civil Aeronautics Act. NOx emission restrictions are particularly stringent.) | <ul style="list-style-type: none"> • All JAL aircraft engines are compatible with the ICAO's CAEP6 and CAEP8 standards (the applicable standard differs depending on when a plane's Certificate of Airworthiness was issued). |

Action Plan 5 We give due consideration to biodiversity.

| Commitment | Status |
|---|--|
| We convey to customers and society at large the importance of biodiversity and follow the "JAL Group Policy on Biodiversity" in our business operations. | <ul style="list-style-type: none"> • We formulated the "Biodiversity Policy of the JAL Group" in recognition of the fact that the JAL Group's air transport business may indirectly impact biodiversity. |
| We take part in the "United Nations Decade of Biodiversity" initiative. In addition, we promote activities that convey the importance of protecting the natural beauty of Japan, including cranes, etc. | <ul style="list-style-type: none"> • We painted the "United Nations Decade of Biodiversity" logo on our aircraft, sponsored a photo contest on the theme of the Japanese red-crowned crane, contributed to the JAL Endemic Rabbit's Forest and served certified coffee on our flights in consideration of biodiversity. |

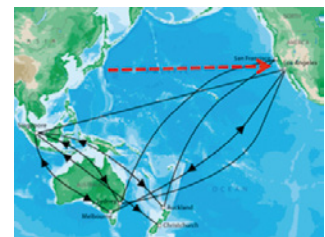
Activities for Preserving Biodiversity

Recognizing that biodiversity is a major environmental issue, the JAL Group formulated the "Biodiversity Policy of the JAL Group" and implemented actions to raise public awareness and encourage the preservation of biodiversity. In 2013, we cooperated with the Endemic Rabbit Trust campaign to preserve and sustain the forest of Amami Oshima, which provides the habitat for an endangered species of rabbit designated as a Special Natural Treasure of Japan. We supported the campaign through donations, Charity Miles and public service announcements for passengers on our Amami flights. We also sponsored a second photo contest on the theme of the Japanese red-crowned crane as a symbol of the importance of preserving Japan's natural beauty.



JAL San Francisco Route Obtains Certification for Reduced Environmental Impact

Our San Francisco route became the first from Japan to obtain certification from ASPIRE (Asia and Pacific Initiative to Reduce Emissions), an international environmental protection initiative in the Asia-Pacific region, for adopting operation methods that reduce environmental impact. We introduced three fuel-efficient, environmentally friendly operation methods (UPR, 30-mile air traffic control intervals, and CDO), which allow us to select efficient altitudes and routes based on the latest weather forecasts and to reduce fuel consumption and noise by conducting more efficient descents. These efforts are expected to reduce CO₂ emissions by 660 tons per year.



► **Environmental Data**

| | FY2011 | FY2012 | FY2013 | Unit |
|--|--------|--------|--------|----------------------|
| Environment | | | | |
| CO ₂ Emissions | 734 | 787 | 820 | 10,000 tons |
| CO ₂ Emissions/RTK (comparison with FY2005) | 88.8 | 88.8 | 89.6 | % |
| NOx (LTO cycle) | 5.66 | 6.08 | 6.26 | 1,000 tons |
| CO (LTO cycle) | 3.51 | 3.76 | 4.39 | 1,000 tons |
| HC (LTO cycle) | 0.63 | 0.64 | 0.72 | 1,000 tons |
| Energy | | | | |
| Electricity Use | 140 | 134 | 129 | Million kWh |
| Heat Use (crude oil equivalent) | 53,209 | 50,997 | 49,633 | 1,000 liters |
| Water Use | — | — | 452 | 1,000 m ³ |
| Waste | | | | |
| Industrial Waste | 2,944 | 4,327 | 3,720 | Tons |
| Ratio of Final Disposal | 1.9 | 0.9 | 1.2 | % |