


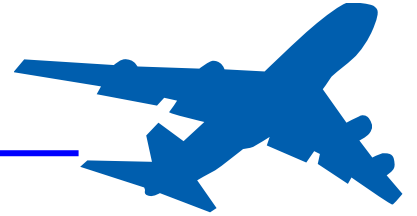
24時間、こころ動かす空港

KIX
KANSAI INTERNATIONAL AIRPORT

Kansai International Airport Smart Island Report

2015

Smart  land



新関西国際空港株式会社
New Kansai International Airport Company, Ltd.



About this Smart Island Report

The “KIX Smart Island Report 2015” is a report with detailed data on the environmental initiatives conducted in fiscal 2014, and the categories of policy and measures described herein correspond to the Third Environmental Plan (“Smart Island Plan”) adopted in April 2013.

About the KIX Smart Island Plan

At the Kansai International Airport we have been working to achieve thirty environmental targets to minimize impacts on the environment (air, water, etc.) for the entire airport island, based on the Kansai International Airport Environmental Plan adopted in June 2001 (dubbed the “Eco Island Plan”).

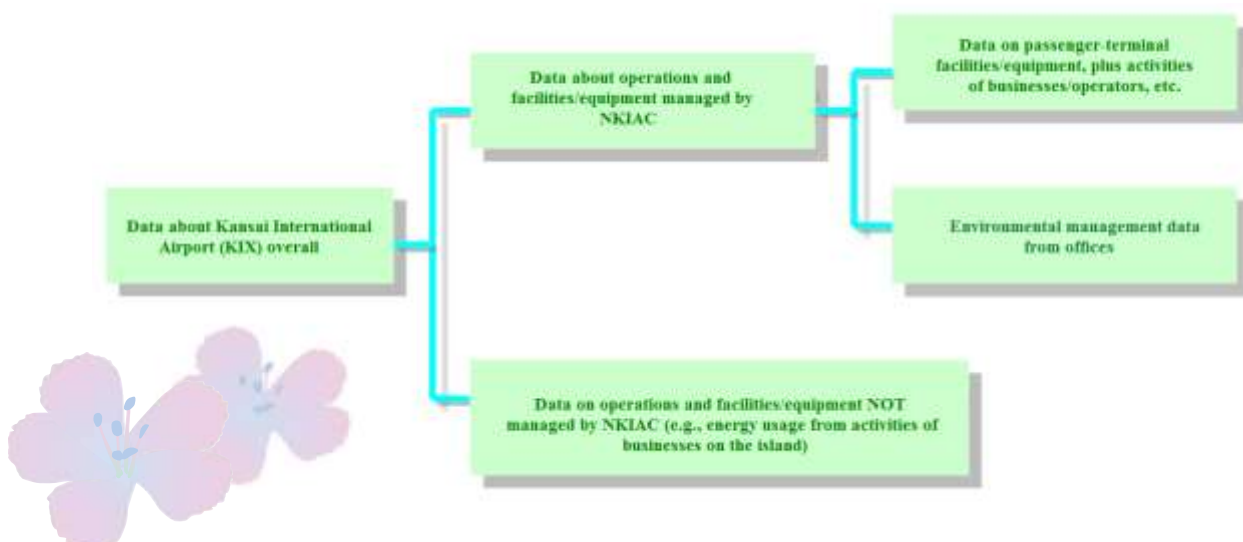
With the start of service of Runway B (August 2007), the Kansai International Airport Environmental Plan was adopted in March 2008, and we have been working since then to reduce environmental impacts from airport-related operations, and also to reduce impacts on the region around the airport.

The management of Kansai International Airport and Osaka International Airport was integrated together in July 2012. The “Kansai International Airport Smart Island Plan” was adopted in April 2013 as a compilation of “smart” initiatives for a new environmentally friendly type of airport. The Plan takes our original Eco Island initiatives as a starting point, but evolves beyond that, aiming to make this a “smart” airport—good for people and good for the planet—through efforts such as the use of clean energy, and better energy efficiency through the use of advanced information technologies.

Initiatives based on the Smart Island Plan are also significant from the perspective of energy security. Through them we are also striving to ensure that airport operations are safe and secure.

Scope of report: This report mainly includes the activities of the New Kansai International Airport Company, Ltd., but it also includes other companies in the corporate group, as well as businesses operating on the airport island that are members of the Kansai International Airport Smart Island Council.

Data presented: Data presented in this report is structured as shown below.



CONTENTS

1. Environmental Plan (KIX Smart Island Plan)	1
2. Environmental management structure and monitoring system	3
3. Fiscal 2014 environmental data overview	4
4. Major measures, targets, and achievements	5
5. Environmental initiatives	
(1) An airport that respects the local environment	8
(2) An airport with minimal impact on the global environment	12
(3) An airport that recycles resources	19
(4) An airport that respects biodiversity	21
(5) An airport that coexists with the local region	24
6. Environmental management at NKIAC offices	27
7. Environmental performance data	
(1) Environmental accounting	29
(2) Environmental performance data	30
8. Chronology of environmental efforts	31
□ Notes	32

1. Environmental Plan (KIX Smart Island Plan)

■ Key components

1. Plan period: Five fiscal years, from 2013 to 2017.

2. Target activities and area: The target area includes the entire area of Kansai International Airport, and in order to consider all environmental impacts associated with airport operations, the target activities include the activities of all users and all businesses/operators involved in airport operations. The New Kansai International Airport Company is to take the lead on activities that are within its control, while actively seeking cooperation from airport business operators and users.

3. Targets: Targets are to be established, as quantitatively as possible, to promote and evaluate the level of achievement of the Plan, and the status of achievement is to be verified and published regularly. An effort shall be made to monitor progress with implementation of the Plan as well as other factors, such as international circumstances relating to climate change countermeasures. The targets are to be revised as appropriate.

4. Organizational structure: The New Kansai International Airport Company, as the airport authority, is to advance and manage (review and improve) the Plan through the Environmental Management Committee, in cooperation with airport businesses and operators in the Smart Island Council, and others.

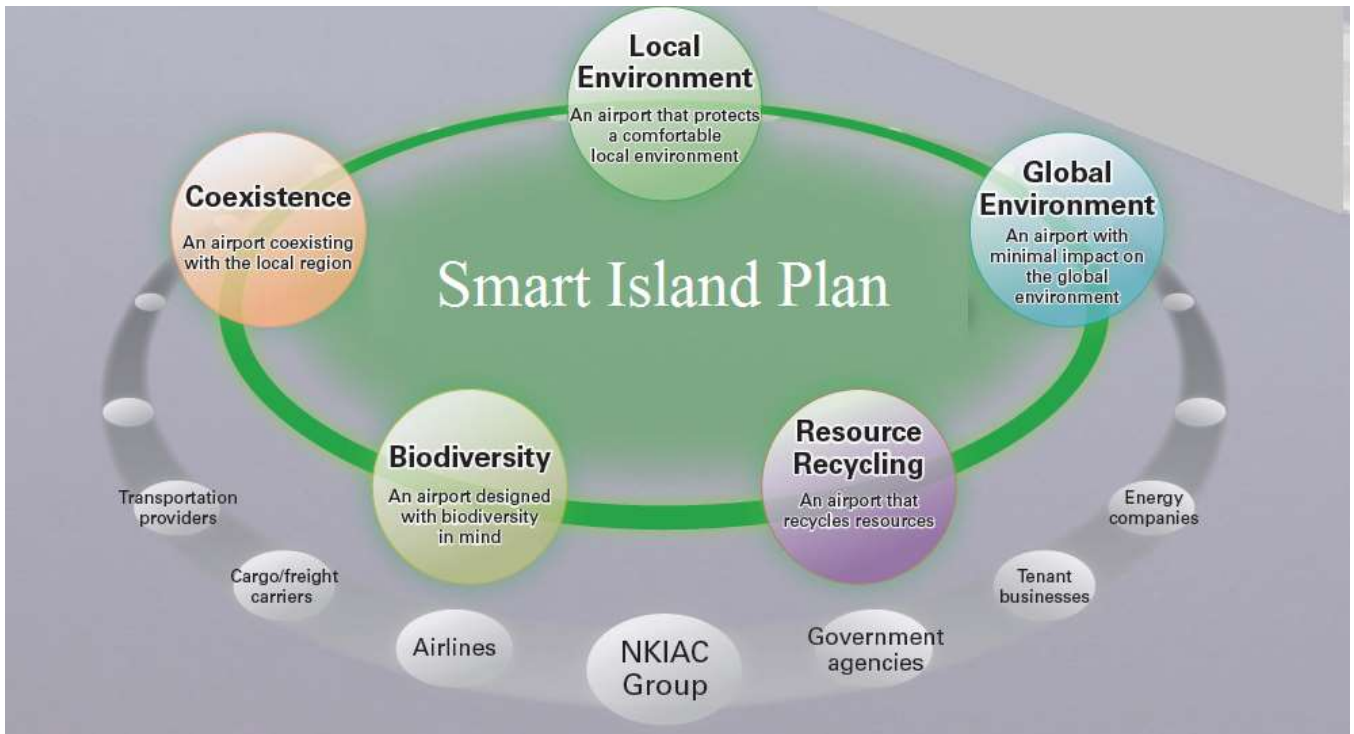
5. Energy management: Electricity consumption and generation on the airport island is to be managed in an integrated way, and energy conservation is to be promoted, including reducing electricity consumption during peak times.

■ Basic Principles

Initiatives are promoted based on the concepts of “safety and security,” “improving customer satisfaction,” and “environmental measures.” With the expansion of area covered by the Kansai Innovation Comprehensive Special Zone for International Competitiveness Development we are engaged in initiatives toward the realization of the Smart Island Vision for an environmentally-advanced airport. This we do in cooperation with members of the KIX Smart Island Council, on the basic principles of “green innovation” (implementation of “smart community” model projects, etc.), “eco operations” (reduction of total energy use at the airport overall), and “eco relations” (reduction of impacts on the local environment as a pollution-free airport).



■ **Basic Policies**



- | | |
|---|--|
| <p>1. An airport that respects the local environment</p> | <p>Continue to comply with environmental standards for aircraft noise and work to further reduce noise levels. Work to protect the environment by not only meeting government regulations for air and water quality, but also by setting our own voluntary standards that are even more stringent.</p> |
| <p>2. An airport with minimal impact on the global environment</p> | <p>Cooperate with the relevant contractors and businesses to show leadership in reducing greenhouse gas emissions arising from activities. Also, promote the introduction of clean energy through the use of renewable energy such as photovoltaics and hydrogen.</p> |
| <p>3. An airport that recycles resources</p> | <p>Continue with efforts to reduce the amount of waste generated and to make efficient use of the waste that does get generated, in order to make this an airport that recycles resources. Also, work to ensure that water recycling systems make efficient use of water resources, such as through efforts to promote the use of reclaimed water.</p> |
| <p>4. An airport that respects biodiversity</p> | <p>Create seaweed habitat around the airport seawalls and maintain them as habitat for a diversity of flora and fauna. Also, increase the amount of greenery on airport grounds, and improve the surroundings to give airport users a sense of comfort and relaxation.</p> |
| <p>5. An airport that coexists with the local region</p> | <p>Aim for good communication with the local community and airport users, provide information to domestic and international users about environmental monitoring and our environmental activities, and provide diverse opportunities to promote an understanding of airport activities.</p> |

2. Environmental management structure and monitoring system

■ Organizational structure

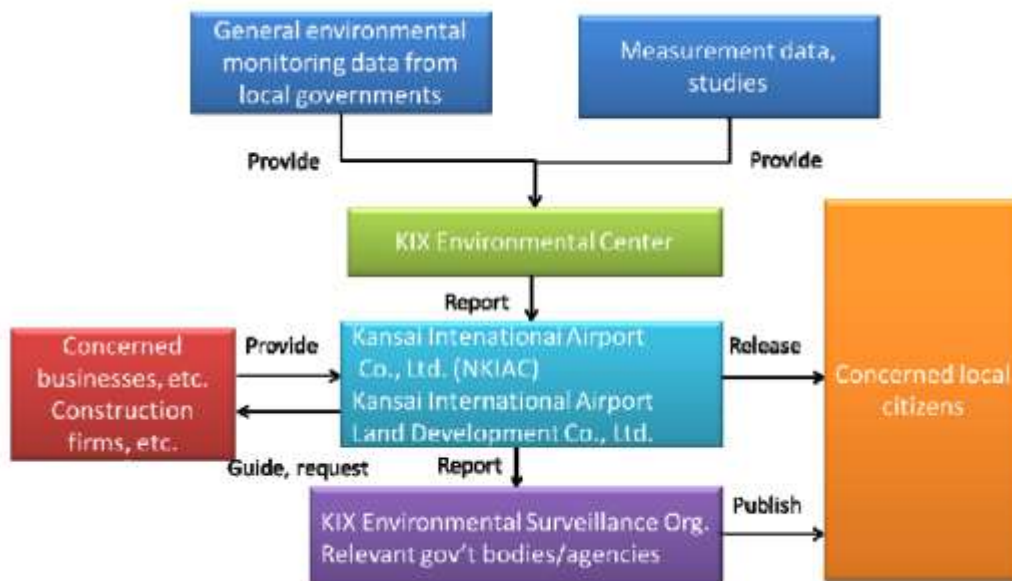
The New Kansai International Airport Company, the airport authority, advances and manages (reviews and improves) the Plan through the Environmental Management Committee, in cooperation with airport business operators in the Smart Island Council, and others. Efforts are also made to share information with the Energy Conservation Committee.



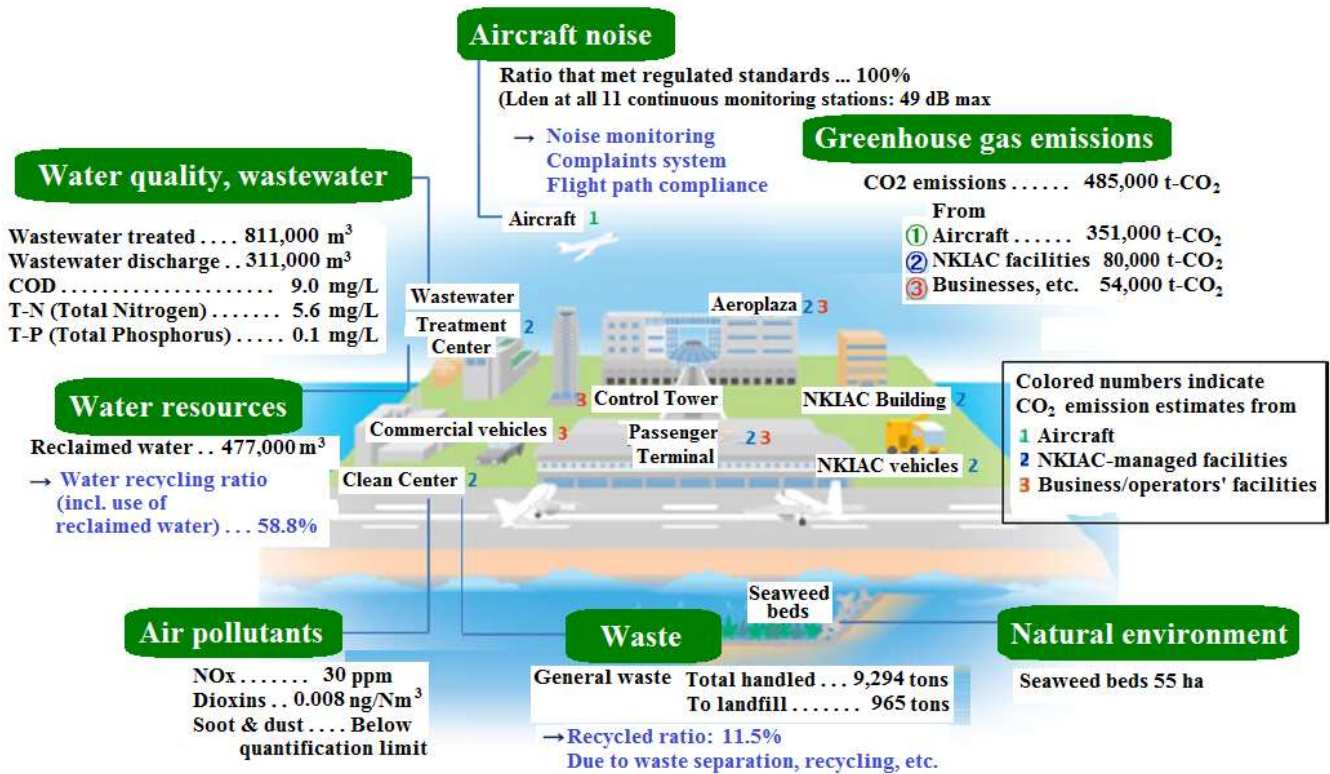
Outline of organizational structure

■ Environmental monitoring system

The environmental conditions around KIX are monitored in order to track the impacts of airport-related operations, construction, and so on. An environmental monitoring plan has been developed under the guidance and direction of the Kansai International Airport Environmental Surveillance Organization (members include the governor of Osaka Prefecture and mayors of nine cities and four towns in the nearby Senshu District). Aircraft noise, air quality, water quality, aquatic life and other environmental parameters are checked regularly. The results of monitoring are reported to the relevant governmental organizations in the form of monthly and annual reports, and are also available at the Kansai International Airport Environmental Center.

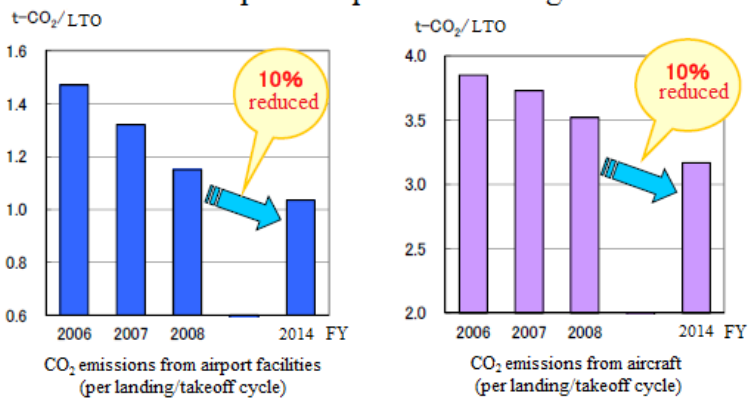


3. Fiscal 2014 environmental data overview






Numerical targets
 We establish targets in order to evaluate progress on efforts articulated in the Plan. Where possible, we establish numerical targets (e.g., air quality, water quality, energy usage, greenhouse gas emissions, recycling rates) for quantifiable categories. For categories where numerical targets are more difficult to establish, we still make our best effort to quantify the status of our initiatives.

Examples of quantitative targets






4. Major measures, targets, and achievements

	Item	Objective	FY2014 achievements	Description	Rated	Page
(1) An airport that respects the local environment	Aircraft noise					
	Reduce aircraft noise, introduce low-noise aircraft	Maintain 100% achievement of environmental standards	Continued to achieve 100% (Lden 57 or less)	Continued environmental monitoring.	—	8
	Ensure compliance with proper flight paths			Encouraged related parties to introduce low-noise aircraft.		
	Consider runway operations, make requests to concerned organizations			Contacted concerned local governments by fax, etc., regarding any deviation from flight path due to weather conditions, etc. Requested KIX Airline Operations Council (AOC), etc., to observe proper flight paths.		
	Air quality protection					
	Encourage the introduction of aircraft with low emissions of air pollutants	Appeal/request, best effort.	Requested efforts by KIX Airline Operations Council (AOC).		😊	
	Emission reduction measures at incineration plant (Clean Center)	Voluntary target of 70 ppm or lower concentration of NOx emissions (Government standard is 187 ppm)	30 ppm (average)	Maintained efforts to ensure that actual nitrogen oxide emissions from incineration plant were well below regulated standards.	😊	10
Improve fuel quality of jet fuel tanker trucks	100% is good quality Bunker A fuel or better	100% good quality fuel is being used	Requested related parties to improve quality of tanker truck fuel.	😊		
Water quality protection						
Reduce impacts of water discharge from wastewater treatment plant	COD level of treated wastewater discharge: Daily average 10 mg/L or lower Daily COD load never to exceed 30 kg/day (1/16th the level predicted by environmental impact assessments)	COD daily average 9.0 mg/L Daily COD load 12.7 kg/day	Established targets to maintain quality of treated water discharge at levels much better than regulated standards, and conducted extensive upkeep/maintenance of facilities. Reused some discharge from wastewater treatment plant as reclaimed water. (See "An airport that recycles resources" section for reclaimed water targets.)	😊	11	
(2) An airport with minimal impact on the global environment	Energy conservation measures					
	Introduce energy-efficient equipment	For new construction or upgrades, use only LED lighting for buildings/facilities and all airport lighting.	79.0% (ratio of LEDs as proportion of lighting installed when upgrading south cargo facilities at Phase 2 runway)		😞	12
	Promote energy-efficient operations	1% average annual reduction in energy intensity of operations managed by NKIAC	1.6% reduction from previous year average FY2009-2013	Conducted "Energy Conservation Patrols," removed some lights to reduce lighting, adjusted air conditioning settings, etc. In FY2014, installed LEDs in Terminal 1, boosted efficiency of electrical pumps installed efficient inverters to fuel pumps, tested insulated glass in Terminal 2 waiting rooms.	😊	
	Reducing greenhouse gas emissions					
	Promote the use of more fuel-efficient aircraft	Reduce greenhouse gas emissions (per aircraft landing-takeoff cycle) by 5% compared to FY 2011	13.5% reduction (FY2011 achievement: reduced from 2.80 to 2.42 tons per LTO cycle)	Increased ratio of fuel-efficient aircraft (ratio of smaller aircraft is increasing).	😊	13
	Reduce the use of auxiliary power units (APU)	Reduce APU use to 10% or less (equiv. to GPU usage of 30%) GPU installation at 100% of parking spots	GPU usage ratio of 80.7% (100% achieved if including use of mobile GPUs at open spots)	Changes made to parts of Aeronautical Information Publications (AIP) since Jan. 2010, reduced time aircraft can use auxiliary power unit (APU) (was 30 minutes before scheduled departure, now 15 min.), boosting use of GPU (ground power units), which have a lower CO2 emission load.	😞	14
	Idling prevention awareness campaigns	Appeal/request, best effort.	Installed signage in parking areas. KIX Smart Island Promotion Council conducted intensive stop idling campaign on June 5, 2014.	Displayed posters from Osaka Prefecture on airport island.	😊	15
	Promote public transportation	Appeal/request, best effort.	Replaced 27 buses in FY2014.	Extended windbreak fence along airport access bridge in April 2008, improving convenience of public transportation.	😊	
Reduce greenhouse gas emissions from airport facilities	Reduce GHG emissions (per landing-takeoff cycle) from airport facilities (excluding aircraft) by 5% compared to FY2011 Reduce plastics content 10% or less	Reduced 20.7% (FY2011 achievement: 1.17 tons/LTO reduced to 0.92 tons/LTO) Plastics content 18.8% of garbage brought to airport island incineration facility.		😊 😞	13	

 Fully achieved target (100% or greater)
  Generally achieved target (90% to 100%)
  More effort needed next year (achieved below 90%)




Note: Targets to be achieved by end of FY2017.

Item		Objective	FY2014 achievements	Description	Rated	Page
(2) An airport with minimal impact on global environment	Promote introduction of eco-cars					
	Promote introduction of eco-cars	Eco-car introduction ratio 100% (EV, FCV, CNG, HV, PHV, ultra-fuel-efficient vehicles) for NKIAC car sharing	• Fleet ratio 53.3% (8/15 vehicles)	• Introduce eco-cars when replacing car-sharing NKIAC vehicles.	☹️	16
		Eco-car ratio 80% (commercial vehicles used on island)	• Fleet ratio 18.6% (329/1,768 vehicles)	• Encourage businesses operating on island to introduce eco-friendly vehicles.		
		Trial use of hydrogen fuel cell vehicles, as appropriate.	• As part of demonstration trial selected by Ministry of Environment in Feb. 2015, launched the first-ever trial operation of a fuel cell-powered forklift at an Asian airport.	☺️		
		Implement in cooperation with related parties	• In cooperation with interested parties (Ministry of Land, Infrastructure, Transport and Tourism, businesses/operators) discussed more use of CNG low-emission vehicles (trucks, limousine buses, shuttle buses) • Now conducting trial operation of hydrogen-powered vehicles, using hydrogen fueling stations (installed May 2007) on airport island.			
	Expand the use of clean energy					
	Expand the installation of hydrogen fueling stations	Best effort	• Now conducting trial operation of hydrogen-powered vehicles, using hydrogen filling stations (installed May 2007) on airport island. (Repeated) • Hydrogen grid project began on May 20, 2014.	☺️	16	
	Install CNG fueling stations	Consider	• In cooperation with interested parties (Ministry of Land, Infrastructure, Transport and Tourism, gas suppliers/operators), discussed construction of CNG fueling stations.	☺️		
	Install electric vehicle charging stations	Best effort	• Installed one rapid-charging station for electric vehicles in the Observation Hall parking lot in March 2011, and a total of four regular chargers in two parkades (P1 and P2) in Dec. 2012. Also installed rapid charger at P5 parkade at Terminal 2, in June 2014.	☺️	17	
	Implement solar power projects	Locally-generated energy accounting for equivalent of 10% of electricity consumption on airport island	• Reached equivalent of 8.8% locally generated	• Launched operation of KIX Megasolar in Feb. 2014.	☹️	18
Use clean energy		• Installed small wind turbine in Sora Park on Phase 2 island in FY2014.				
(3) An airport that recycles resources	Achieve zero emissions					
	Reduce general waste volume. Recycle resources.	13% recycling rate for general waste	• Recycling ratio 11.5%	• Issued rules for waste separation in "Regulations Governing the Use of Waste Processing Facilities." • Introduced separated waste collection by airline companies for garbage from aircraft.	☹️	19
		80% reduction (compared to FY2008 actual results)	• Reduced 63%	• Promoted the "Paper Diet Challenge" to reduce paper use in offices.	☹️	27
	Reduce industrial waste volume. Recycle resources.	Appeal to businesses/operators on airport island	• Requested efforts: proper disposal of industrial waste, waste prevention, reuse of waste plastic from packaging, etc.	☺️		
	Effective use of construction byproducts	100% recycling of soils/sand from projects on island	• Recycling ratio 100%	• Recycled/utilized in construction related to new terminal (T3), seawall, etc.	☺️	
	Green purchasing	Continue efforts	• Selected green options as much as possible when purchasing products.	☺️		
	Water conservation, water recycling					
	Promote water conservation actions	Reduce fresh water consumption by 5% from FY2011 levels (per landing/takeoff cycle)	• Reduced by about 37% (from 7.5 to 4.7 m ³ /LTC)	• Encouraged relevant parties to save water, with use of automatic taps, water-conserving devices.	☺️	20
Use reclaimed water	55% usage rate (percentage of wastewater reclaimed/recycled)	• Water recycling ratio: 53%	• Encouraged the use of reclaimed/recycled water.			

 Fully achieved target (100% or greater)
  Generally achieved target (90% to 100%)
  More effort needed next year (achieved below 90%)

Note: Targets to be achieved by end of FY2017.

	Item	Objective	FY2014 achievements	Description	Rated	Page
(4) An airport that respects biodiversity	Natural environment					
	Protect/grow seaweed beds, coastal vegetation	Maintain seaweed beds. Aim for 20% increase above FY2010 (was 47 ha).	• Seaweed habitat, area: 55 ha (studied Mar. 2013), 17% increase over FY2010.		😊	21
	Expand greenery on airport island	Expand greenery on airport island by 20%.	• Continued with greening efforts on airport island.		😊	22
	Scenic views					
	Protect landscape/views on airport island	Continue efforts	• Worked to protect scenic views: KIX Sora Park; KIX Sora Farm; water features along inner water between airport islands; terminals; etc.	😊	23	
Create spaces for resting and relaxation	• Created spaces for resting/relaxation by using inter-island water area, KIX Sora Park.					
(5) An airport coexisting with the local region	Information provision					
	Publish environmental monitoring data	Ongoing release of monitoring data. Prepare Environmental Report each fiscal year.	• Published environmental monitoring data (aircraft noise, air quality, water quality, etc.), environmental reports on website, etc. • Installed monitors showing electrical generation of solar panels (KIX Megasolar), visually displaying environmental information • Added Airport Island Phase 2 tour to Waku Waku Airport Explorer Tours.	😊	24	
	Dialogue with the local community					
	Provide environmental information	Provide website, reports, pamphlets	• Included environmental management plans, Smart Island Reports, environmental monitoring data, etc., on company website.	😊	24	
	Provide opportunities for environmental education, etc.	Continue efforts	• Provided environment-related public relations materials at KIX Environmental Centre at the KIX Observation Hall (29,649 visitors in FY2014) • Held environmental events in Oct. 2014 on theme of environmentally-advanced airport, including science classes on theme of hydrogen and aircraft. • Provided guest speakers and airport tours for primary school students (25 schools in FY2014).	😊	24 25	
	Cooperation with airport-related businesses					
	Coordinate Smart Island Promotion Council	Continue efforts	• In partnership with businesses/operators on airport island, promoted environmental protection, environmental education, etc.	😊	26	
Collaborate with other airports in Japan and overseas	Continue efforts	• Carried out information exchanges and dialogue with Narita International Airport and Chubu International Airport through the Environmental Liaison Committee for Major Airports. • In September 2014, attended the 4th ACI Asia-Pacific Regional Environment Conference, and reported on clean energy initiatives of Kansai International Airport. • In March 2015, hosted 7 persons from Airports of Thailand Public Company (AOT) for 4 days, for exchange of information and experience.				

 Fully achieved target (100% or greater)
  Generally achieved target (90% to 100%)
  More effort needed next year (achieved below 90%)

Note: Targets to be achieved by end of FY2017.

5. Environmental initiatives:

(1) An airport that respects the local environment

KIX was built five kilometers off the coast of the Senshu District in order to minimize the impacts of aircraft noise. Measurements of aircraft noise have shown that environmental standards are being met at all monitoring sites. For emissions from our incineration plant and wastewater discharged from our wastewater treatment plant, we have voluntarily set standards that are more stringent than required by regulations, in an effort to minimize our impacts on the environment.

■ Efforts to minimize the impacts of aircraft noise

Environmental assessments based on flight paths and flight procedures established to minimize aircraft noise found that only areas over water were affected by noise levels exceeding environmental quality standards.

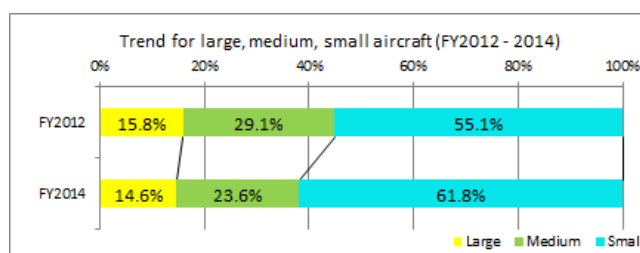
KIX conducts both continuous and periodic monitoring of aircraft noise, and publishes the findings. For fiscal 2014, as in the prior year, noise levels complied with environmental standards (maximum Lden 157 dB, see Note 1) at all land-based continuous monitoring stations and periodic monitoring sites.

○ FY2014 Aircraft noise monitoring results
(continuous monitoring stations)



Efforts to minimize the impacts of aircraft noise

- Measures at noise sources
 - Use quieter aircraft (Note 2)
- Flight paths and aircraft operation
 - Aircraft are expected to fly over land only after gaining sufficient altitude over Osaka Bay after takeoff from the runway.
 - Aircraft arriving or departing late at night or in early morning are restricted to flight paths in airspace over Akashi Strait and Kitan Strait.
 - Flight procedures have been adopted to minimize noise from aircraft approaching the airport from Kitan Strait (Note 3).
 - Continuous descent flight procedures have been adopted (Note 4).
- NKIAC initiatives
 - Continue monitoring for compliance with established flight paths and altitudes.
 - Communicate with KIX Airline Operations Council to request that members observe established flight paths and give due consideration to the need to minimize noise, etc.



For Notes 1 to 4, please see page 32.

■ Complaints, inquiries, and responses

Aircraft noise

The annual number of complaints and inquiries peaked at 263 in fiscal 1998 when new flight paths were introduced in airspace over the Osaka Prefecture region, and since then have been on a declining trend. The majority of complaints and inquiries were about individual aircraft being too loud or flying too low, or queries about whether aircraft were staying on their regular flight paths. In response, we study these issues in cooperation with the Civil Aviation Bureau (under the Japanese Ministry of Land, Infrastructure, Transport and Tourism) and publish our findings. We will continue to respond appropriately to complaints and inquiries.

◆ Inquiries

New Kansai International Airport Co., Ltd.

Corporate Communication Department

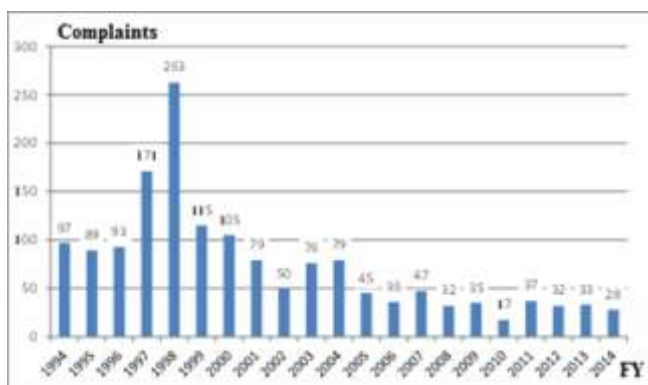
Smart Island Promotion Group

Tel: 072-455-2177 (weekdays 9 am to 5:30 pm)

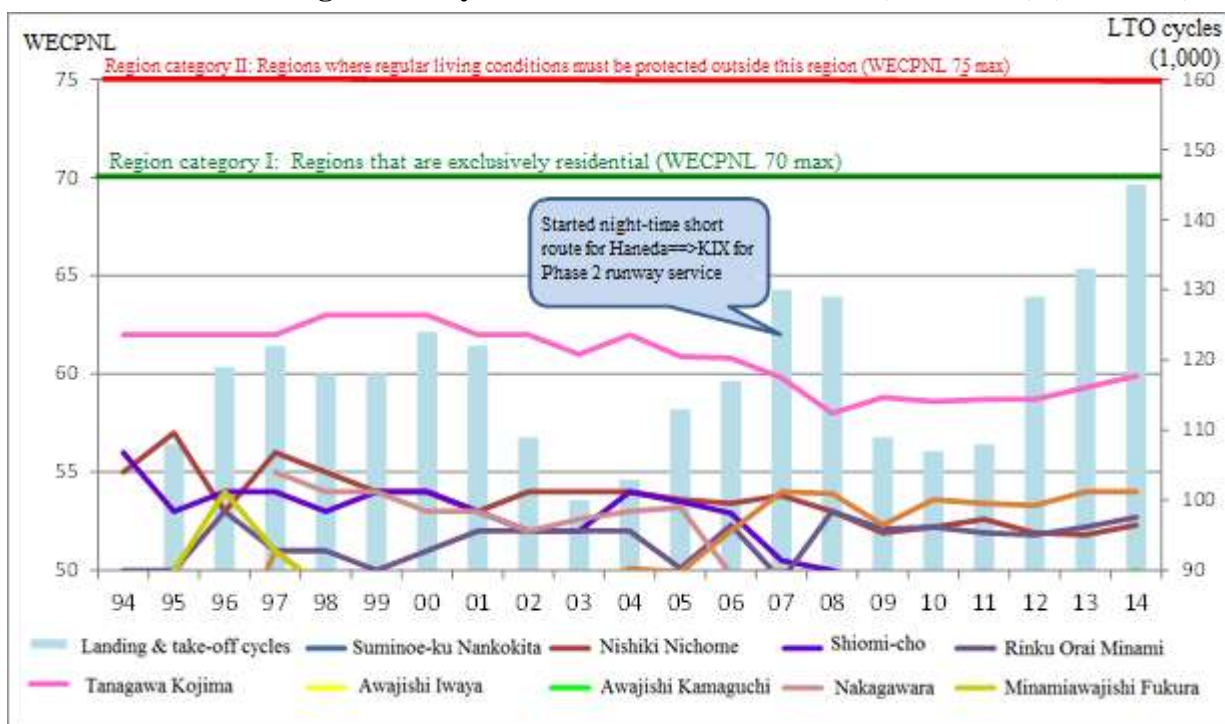
Airport Information Center,

Kansai International Airport

Tel: 072-455-2500 (night time and holidays)



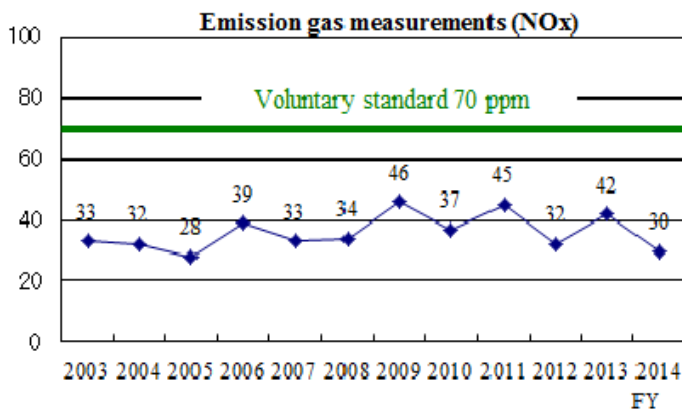
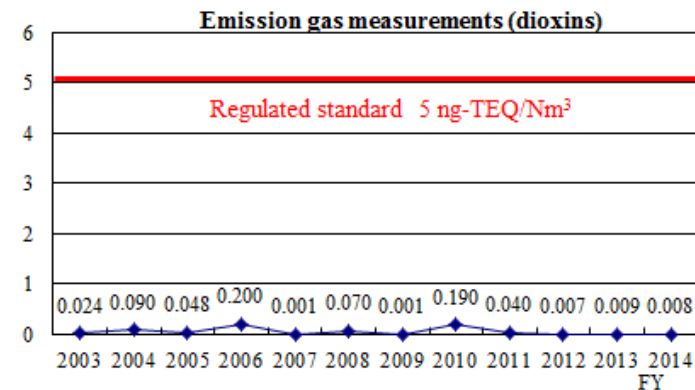
Trends in aircraft landing/takeoff cycles and noise measurements (WECPNL) (See notes)



Notes:

1. WECPNL was used until FY2012 as an environmental standard measure of aircraft noise, replaced by Lden starting in FY2013.
2. Noise measurements were WECPNL 50 or less at Suminoe-ku Nankokita and Awajishi Kamaguchi.
3. WECPNL 50 or less: Shiomi-cho (2009-10, 2012-13), Awajishi Iwaya (1994-96, 1998-2003), Awajishi Nakagawara (2008-13), Minamiawajishi Fukura (1994, 1998-2013) (fiscal years)
4. Nishiki and Fukura (1994-97 scheduled monitoring), Iwaya (1994-96 scheduled monitoring), Nakawara (started continuous monitoring in 1997), Nankokita (same: 1998), Kamaguchi (same: 1998)

■ Measures to reduce emissions from incineration plant



General waste from the airport island is separated into combustibles and recyclables, and combustible waste is then incinerated at our incineration plant. Emissions from incineration go through a filter-type precipitator.

The installation of a garbage shredder has significantly improved the furnace's incineration efficiency; air pollutant levels such as nitrogen oxides are below regulated emission standards. Dioxin emissions are also well below regulated standards. Waste heat from incineration is being used as a source of heat for the incinerator, and for hot water and air conditioning at the incineration plant.

Incineration plant (Clean Center)

Plant description

This plant is designed with a fluidized bed furnace. It also uses a filter-type precipitator that uses catalysts to remove nitrogen oxides, as well as humidity-regulated fly ash stabilizing equipment. The plant was designed with special consideration of the local surroundings.

Exhaust gas flow

Emissions at about 850°C from the incinerator's furnace are directed into a cooling chamber, through heat exchangers designed with heaters to prevent white smoke (Note 5), and then to a reactor. Dust and hazardous gases are then removed by a filter-type precipitator, and exhaust gases are released into the atmosphere via an induced-draft fan and an exhaust stack. We operate with voluntarily-adopted strict standards at the stack outlets for dust, sulfur oxides, hydrogen chlorides, and nitrogen oxides, with maximums of 0.02 g/Nm³, 20 ppm, 30 ppm and 70 ppm, respectively.

Note: Operational information about the KIX Clean Center is published online on the following website (in Japanese): <http://www.nkiac.co.jp/env/kix/kanshi/clean/index.html>

For Note 5 please see page 32.



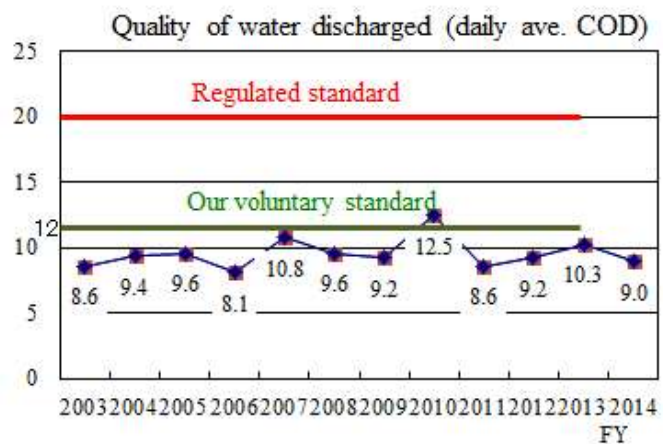
Incineration plant (Clean Center)



Central control room

■ Advanced treatment of general wastewater

General wastewater from airport-related facilities is directed to a wastewater treatment plant for advanced treatment before being discharged. The treated water being discharged is significantly cleaner than legally-required standards, based on our own more stringent voluntary standards (e.g., COD daily average 12 mg/L, and further tightened to 10 mg/l starting in FY2014). Our laboratory is equipped with a variety of testing equipment, which ensures rigorous control of water quality until the point treated water is discharged into Osaka Bay. We also strive to maximize the effective use of water resources and to consider the local environment, such as by using some of the advanced-treatment water for flush toilets and the watering of plants.

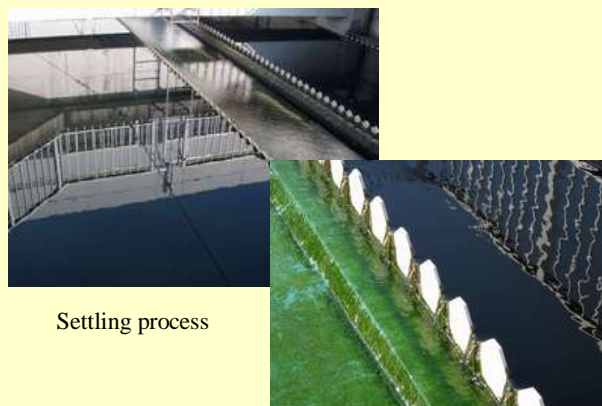


Wastewater treatment plant

Wastewater from the passenger terminal buildings and other airport facilities is considered to be general wastewater, and undergoes advanced treatment such as activated-sludge circulation nitrification/denitrification, chemical clarification (coagulation/sedimentation), and rapid sand filtration. Special wastewater from industrial sources first undergoes onsite pre-processing to remove hazardous substances, and then undergoes advanced treatment at the wastewater treatment plant, through chemical coagulation/sedimentation and rapid sand filtration processes, etc. After advanced treatment, the treated water is reused as reclaimed water for airport flush toilets, watering plants, etc., and any surplus amount is discharged into the sea.

Treatment capacity	General wastewater 10,050 m ³ /day Special wastewater 3,300 m ³ /day
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In fiscal 2014, average processed volumes were 2,006 m³/day of general wastewater and 216 m³/day of special wastewater.



Settling process

(2) An airport with minimal impact on the global environment

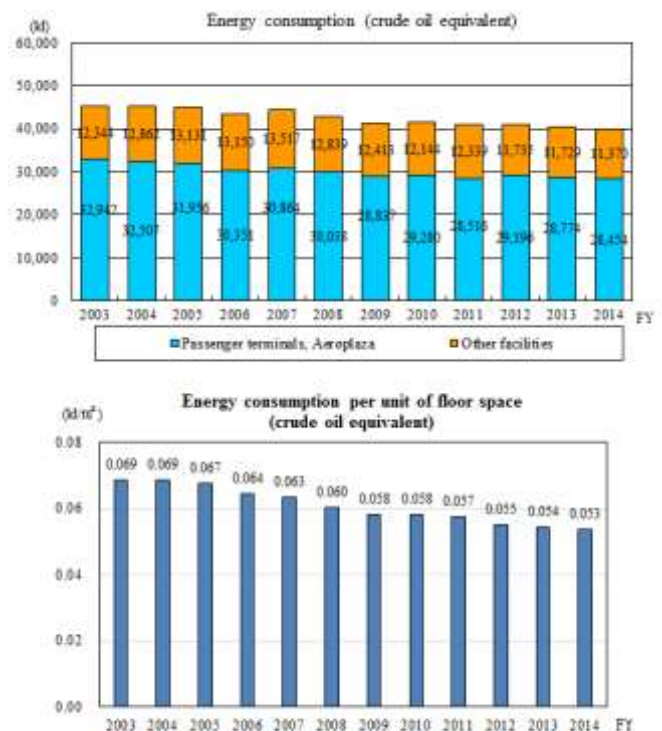
Our Energy Conservation Committee is working to promote energy efficiency at KIX, including consideration of ways to boost the efficiency of energy use. Guided by our “Office Environmental Management Manual,” we are making advances in green purchasing and energy conservation, and going paperless in our offices. We are also working to reduce CO₂ emissions through various initiatives, including the use of hydrogen fuel cells and clean energy such as solar power, promoting the use of ground power units, and discouraging vehicle idling.

■ Promoting energy conservation

Since the Energy Conservation Committee was established in fiscal 2002, it has been engaged in investigation, analysis, action, and the development of programs to conserve energy. Since September 2006 it has been implementing a medium- and long-term plan based on Japan’s Energy Conservation Act (enacted April 2010). To date, we have implemented a number of organizational initiatives, such as introducing control systems in passenger terminal gate lounges to adjust air conditioning according to aircraft arrival and departure information. (That system was awarded the Minister’s Award at the Ministry of Economy, Trade and Industry’s Fiscal 2006 National Energy-Efficiency Best Practices Conference.)

We also started the practice of “Energy Conservation Patrols” and based on their findings have made facilities upgrades as well as changes in the operation of air conditioning and lighting, in order to conserve energy. In fiscal 2014, KIX was able to cut about 1,577 tons of CO₂ emissions annually through a combination of measures, including the conversion to LED lighting and installation of efficient electric sanitation pumps in Terminal 1, and improved heat-blocking features for windows in Terminal 2 waiting lounges.

In response to requests to conserve energy during electricity shortages, in fiscal 2014 we were able to reduce electricity consumption by about 8.4% in summer and about 11.1% in winter compared to 2010, by initiatives that included turning off some lighting, and halting some air conditioning fans in machine rooms and elsewhere.



New LED lighting in Terminal 1



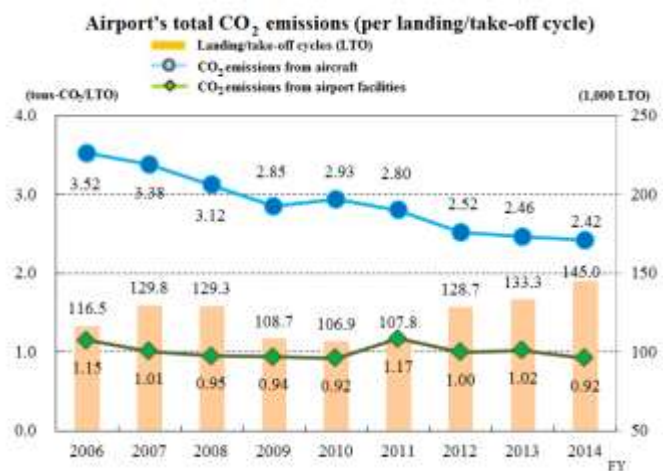
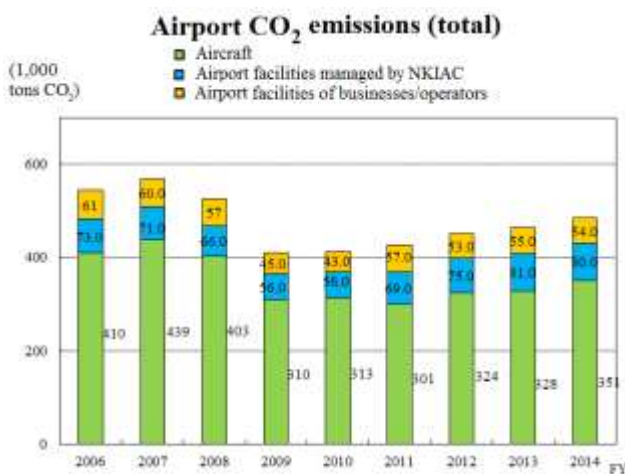
Heat-blocking in Terminal 2



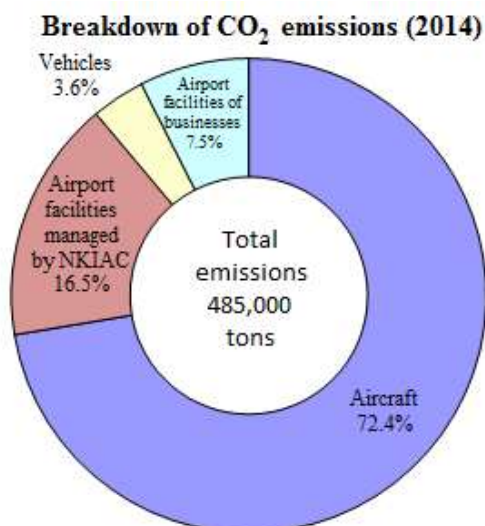
High-efficiency electrical sanitation pump

■ Reducing greenhouse gas emissions

The CO₂ emissions from operations at KIX amounted to 485,000 tons in fiscal 2014. This represents an increase of about 4.6% over the previous year, but CO₂ emissions per aircraft landing and takeoff cycle declined. These results are believed to be due to an increase in aircraft landings and takeoffs, as well as an increase in the ratio of small aircraft. CO₂ emissions from airport facilities managed by NKIAC and airport facilities of businesses have declined due partly to the benefits of greater energy efficiency. The largest share of CO₂ emissions is from aircraft, at 72.4% of the total, followed by 16.5% from passenger terminals and other airport facilities. From the perspective of the global environment, the KIX Smart Island Plan includes measures to fight global warming, including increased use of ground power units (GPUs) and efforts to stop vehicle idling (see page 15). We intend to intensify these efforts in the coming years.



Notes for graphs: (1) Figures are per aircraft landing/takeoff cycle. CO₂ emission factors associated with procured electricity are calculated from Kansai Electric Power Co. coefficients for each year. (2) When the Plan was written, we intended to use the fiscal 2006 emission factors, but later decided to use specific factors for each year, in order to more closely match actual emissions.



Criteria for calculation of emissions:

- Emissions from aircraft are calculated to include the airport-related portion of the aircraft landing/takeoff (LTO) cycle as defined by the International Civil Aviation Organization (ICAO) (i.e., movement of the aircraft between an altitude of 3,000 feet and the ground for both landing and take-off).
- Emissions from vehicles are from vehicles operating within the airport's restricted areas, and exclude trains, ships, and vehicles travelling to and from the airport.

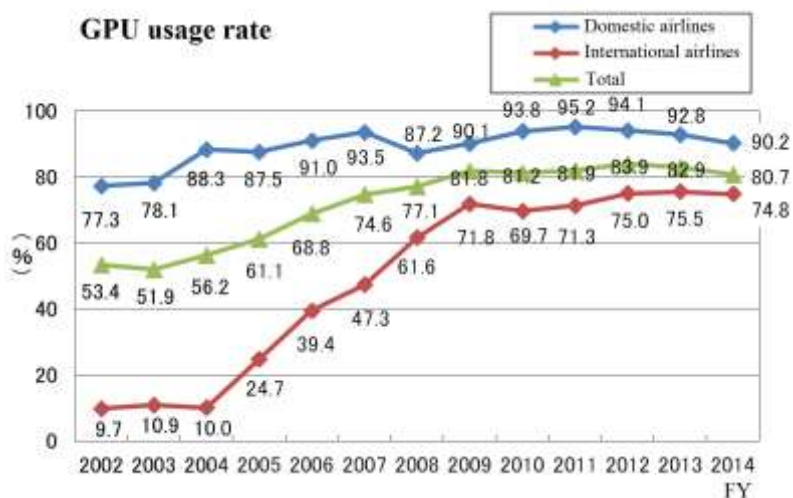
■ Promoting the use of ground power units (GPUs) (See Note 6)

The electricity required by parked aircraft to run air conditioning and other systems is usually provided by an onboard auxiliary power unit (APU).

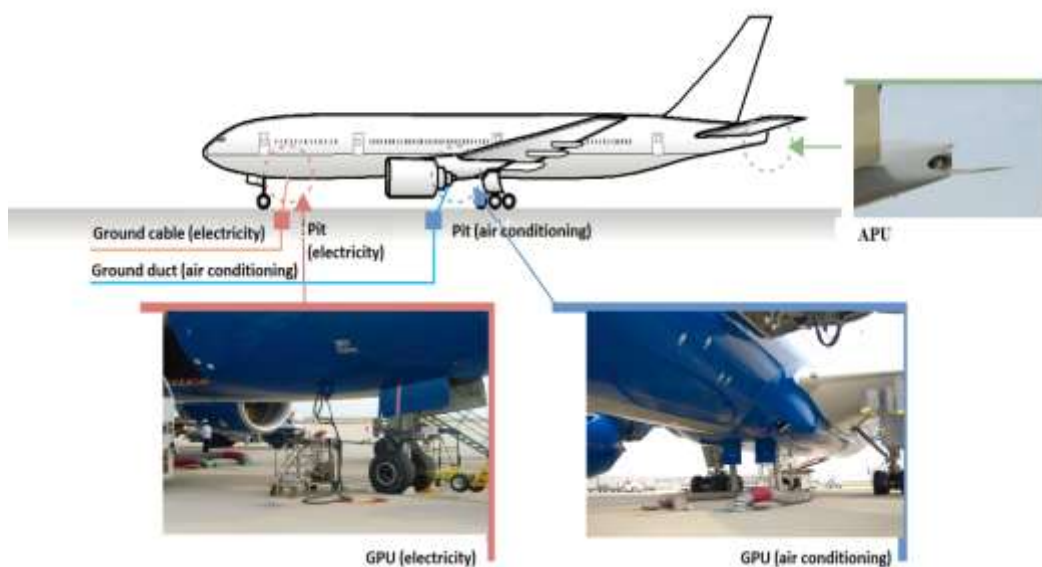
To reduce air pollution from APUs, we have installed ground power units (GPUs) to provide electricity and air conditioning to aircraft parking spots, and are asking airlines at KIX to use them.

Also, as the first case in Japan, KIX had changes made to the Aeronautical Information Publications (API, see Note 7) pertaining to GPU usage, starting in January 2010, reducing the period of time an aircraft can use its APU—from 30 minutes prior to scheduled departure, to the shorter time of 15 minutes.

In fiscal 2014 the ratio of GPU usage (including mobile units) was 80.7% overall.



Note: Graph indicates the ratio of actual number of times (i.e., flights) GPUs were provided compared to number of opportunities to provide (i.e., flights). For FY2001 to 2008, the ratio indicates only stationary GPUs, while from FY2009 onward it also includes mobile units. The calculations from FY2012 onward exclude low-cost carrier (LCC) airlines, which have shorter aircraft parking times.



Airlines with 100% usage ratio (including other companies' GPUs) in FY2014

This is the summary of 10 Japanese airlines and 53 international airlines, totaling 63 airlines. The following four airlines had a GPU usage ratio of 100% in fiscal 2014 (only airlines that used GPU for all 12 months of the fiscal year): Alitalia, Federal Express, Malaysia Airlines, Vietnam Airlines, (alphabetical order).

For Notes 6 and 7, please see page 32.

Benefits of using ground power units at KIX:

CO₂ emissions reduced by the use of GPUs in FY2014:

46,000 tons

Note: Reduction is calculated as the difference between CO₂ emissions from GPU use and the emissions that would have occurred if only APUs were used.

■ Idling prevention awareness campaigns

To reduce the idling of vehicles, signs and posters are displayed in parking lots, and during the international Environment Month in June each year, the Smart Island Council conducts an idling-prevention awareness campaign targeting drivers and users of the airport (June 5 in 2014).

Also, as an entity specified under Japan's NOx and PM Act, we prepare a vehicle-use management plan to reduce emissions of nitrogen oxides and particulate matter, take voluntary actions to reduce traffic volume, and report annually to Osaka Prefecture.

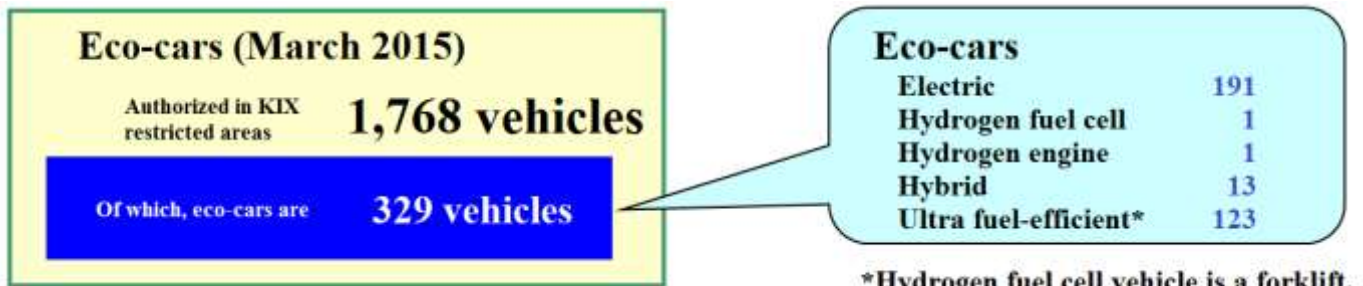


Examples of Idling Prevention Campaign activities



■ Introduction of eco-cars

We are making an effort to gradually introduce eco-cars (electric, fuel cell, compressed natural gas, hybrid, plug-in hybrid, and ultra-fuel-efficient vehicles) when vehicles are being replaced and other opportunities arise. We are also encouraging businesses and operators on the airport island to make the shift to eco-cars. Eco-cars account for 329 of the vehicles authorized to operate inside the restricted areas (Note 8) at the KIX airport; 191 of them are electric vehicles. (Eco-cars are 18.6% of total fleet.)



Note: Ultra-fuel-efficient vehicles meet the following emission and fuel efficiency standards.

1. Gasoline vehicles
Emissions standards: 75% below Japan's 2005 standards
Fuel efficiency: Meet/exceed Japan's 2015 standards or 25% of 2010 standards

2. Diesel vehicles
Emissions: Meet post new long-term standards
Fuel efficiency: Meet or exceed Japan's 2015 standards

● Trial use of hydrogen fuel cell vehicle

Expectations are high for hydrogen as the ultimate clean energy and its potential to fight global warming, as water is its only by-product of combustion. A hydrogen fueling station was installed at KIX in May 2007. Vehicles running on hydrogen-powered engines were being operated for commercial use, and between October 2012 and March 2014, buses powered by fuel cells running on hydrogen were in trial operation as shuttle buses between the Aeroplaza and Terminal 2.

In addition, aiming to be an "environmentally advanced airport," we have been encouraging the introduction of eco-cars, and in April 2015 obtained a Toyota Mirai, the world's first hydrogen fuel cell vehicle.



Hydrogen fuel cell vehicle (Toyota Mirai)



Hydrogen fueling station



Hydrogen engine car

For Note 8, see page 32.

■ Expanding the use of clean energy

● Electric vehicle charging stations

In April 2011 we started operation of rapid chargers for electric vehicles (EV) in the Observation Hall parking lot, and in December 2012, we installed and started operation of two regular chargers (plug-in type) each in two airport parkades (P1 and P2).

One rapid charger available 24 hours a day was also installed in Parking Lot 5 (open air) at Terminal 2 in June 2014. Customers can now come to KIX airport facilities being fully confident that they can charge their electric vehicles.



EV regular charger in parkade

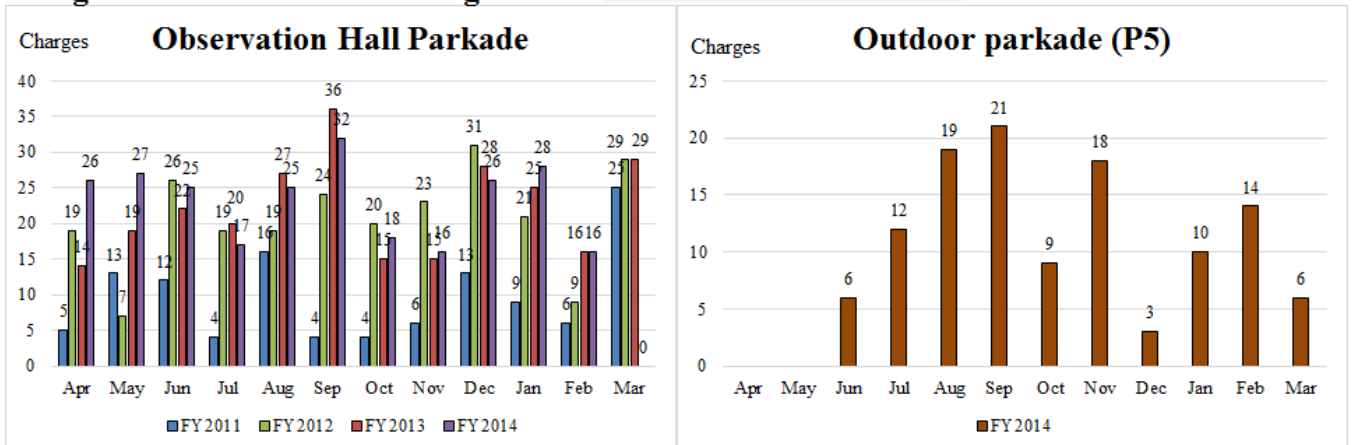


EV rapid charger, at Observation Hall



EV rapid charging station, 24 hours a day (Terminal 2 parking lot)

Usage of electrical vehicle chargers



● Kansai International Airport Taxi Operators Council



Hybrid taxis

The taxi industry is also making an effort to switch to eco-friendly vehicles to realize a low-carbon society. The Kansai International Airport Taxi Operators Council has introduced 18 hybrid cars, or about 38% of the total fleet of 48 vehicles.

● **KIX Megasolar: One of the largest solar panel installations of any airport in Asia**

The KIX Megasolar system began generating electricity in February 2014, from photovoltaic panels installed on the ground along planned taxiway expansions on the south side of Runway B and on warehouse roofs, etc.

This megasolar installation is expected to produce about 1.2 million kilowatt-hours of electricity, the consumption of about 2,100 typical households and equivalent to about 7% of the total electricity consumed at Kansai Airport. The system generated about 16.17 million kilowatt-hours by the end of March 2015, reducing CO₂ emissions by about 8,457 tons.

A photovoltaic system with 358 solar panels was installed on the roof of the temperature-controlled building for medical products, built in September 2010 in the international freight zone. The system generated about 49,000 kilowatt-hours in fiscal 2014, reducing CO₂ emissions by about 26 tons.



KIX Megasolar

● **Wind power generation**

Since fiscal 2012 the KIX Sora Park has had three outdoor lights powered by wind turbines and solar panels. In fiscal 2014 they generated about 150 kilowatt-hours of electricity, helping to save energy.

Also, a 5-kilowatt small wind turbine installed as a symbol of the KIX Smart Island Vision started operating in July 2014, and in fiscal 2014 generated about 1,191 kilowatt-hours of electricity. It is a model case, the first to be installed at an airport in Japan, and we intend to study impacts such as low-frequency sound, and monitor its power-generation capacity.



Small wind turbine generates electricity

● **Hydrogen Grid Project: Creating a hydrogen grid airport**

On May 20, 2014, we officially launched the Hydrogen Grid Project, and in February 2015, started trial operation of a fuel cell-powered forklift in the international freight zone of the airport, as a part of the Fuel Cell Forklift Practical Application and Development/Testing of Optimal Hydrogen Infrastructure Improvements Project chosen by the Ministry of the Environment. This is the first such forklift of its kind to be used at any airport in Asia. Trial operations began at the KIX-Medica temperature-controlled building for medical products. This one emits fewer CO₂ emissions than conventional forklifts, and will significantly boost work efficiency, with a refueling time of about three minutes, and no need to recharge or change batteries.



Kickoff ceremony for demonstration trials

Hydrogen fuel cell powered forklift



(3) An airport that recycles resources

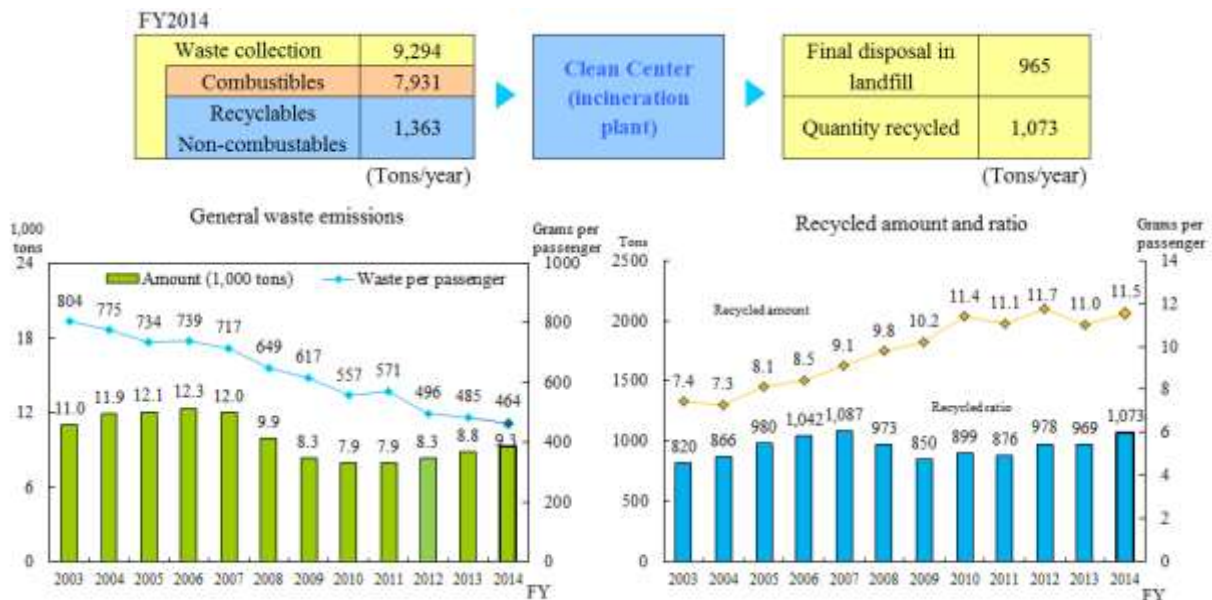
We are working to ensure proper management of waste generated on the airport island, including efforts through recycling and the reduction of waste volume. By using reclaimed water, we are also promoting the efficient use of water resources.

■ Waste reduction and recycling

The more than 10,000 tons of general waste generated at KIX each year come mainly from sources such as aircraft, airline catering plants, and passenger terminal buildings. In order to recycle and reduce this volume of general waste, we have written rules for waste separation in “Regulations Governing the Use of Waste Processing Facilities” and have reached out to businesses operating at the airport, urging them to sort their waste. The result is a slight increase to 9,300 tons of waste generated at the airport in fiscal 2014, but the amount per passenger has declined, and the recycling ratio was 11.5% for general waste.

Waste category	Description
Combustibles	Kitchen waste, wood waste, non-recyclable paper, rags, other
Recyclables	Cans: Steel, aluminium
	Glass bottles: Bottles (unbroken)
	PET bottles
	Waste paper: Newspaper (excluding advertising), magazines
	High-quality used paper: Copy paper, office paper
	Documents (excluding confidential materials)
Cardboard	
Non-combustibles	Glass dishes, ceramic dishes, glass bottles (broken), metal waste
Large combustible items	Wood waste, cloth, briefcases, grass clippings, wooden products

As for industrial waste, we have been encouraging businesses operating at the airport to make efforts to manage waste properly, avoid waste generation, and recycle.

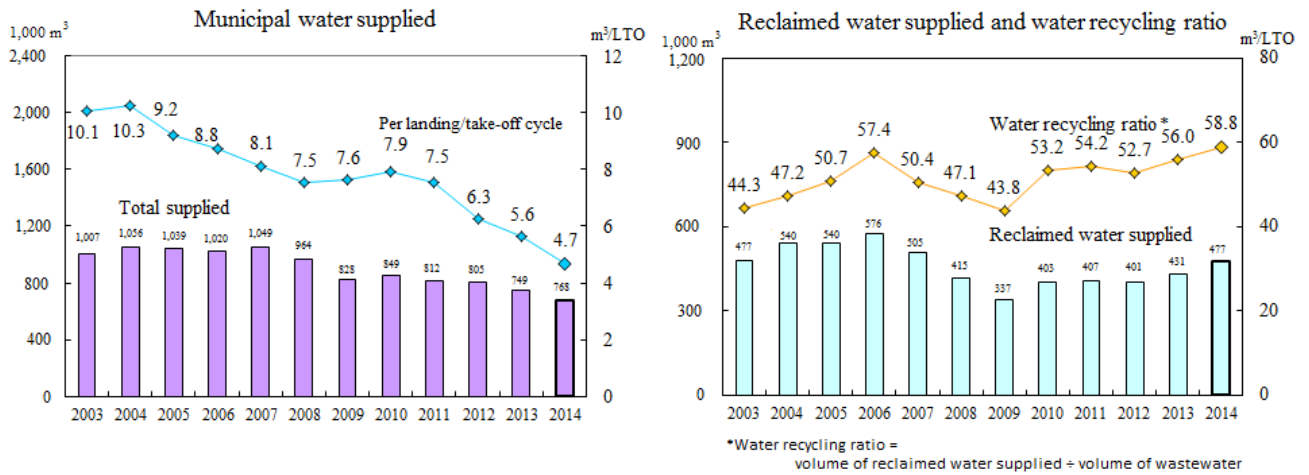


● Efforts of airport island businesses to reduce waste generated

Japanese domestic airlines: About 20% of the total amount of waste generated at KIX comes from aircraft. Recognizing the need to reduce waste by sorting it and reducing its volume, airlines including JAL and ANA sort garbage coming from the aircraft passenger cabins. They are also separating out used newspapers from aircraft cabins. A large quantity of packing material (plastic) is used in air cargo operations to prevent leakage, etc., and an effort is being made to recycle rather than treating it as waste.

■ Reducing clean water usage, using reclaimed water

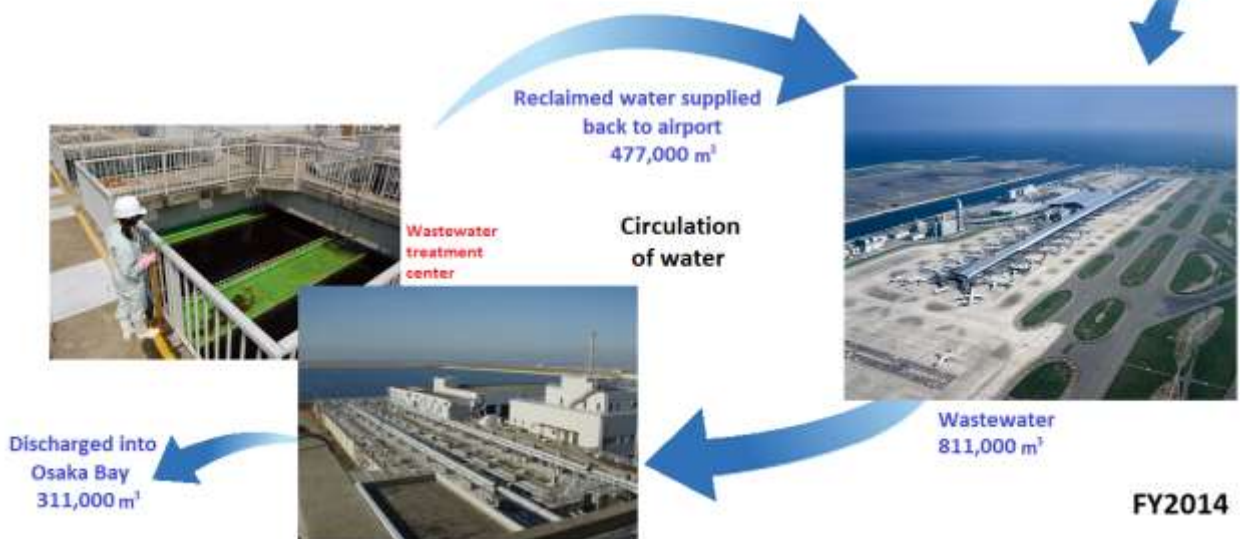
In fiscal 2014, a total of 678,000 cubic meters of water was supplied to the airport (equivalent to 4.7 cubic meters per landing/take-off cycle). On the airport island, reclaimed water is used for flush toilets and for watering plants, as well as for cleaning roads and other ground surfaces. In fiscal 2014, we used 477,000 cubic meters of reclaimed water, and our water recycling rate was 58.8%.



Uses of reclaimed water



Municipal water supplied
678,000 m³

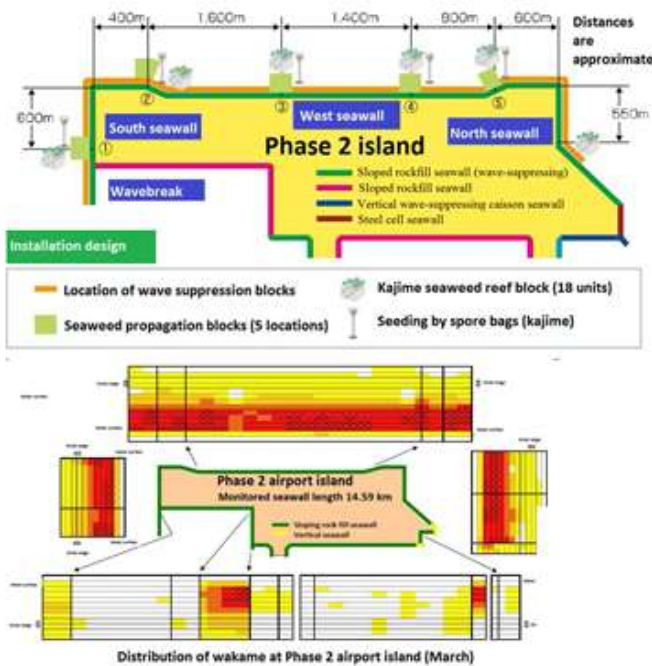


(4) An airport that respects biodiversity

Seaweed beds have been planted to help create marine habitat in Osaka Bay and we have been monitoring their growth. An effort was made to provide better growing conditions for seaweed by installing special blocks on the sloping rock-fill seawalls built for the Phase 2 airport island construction, and a number of other approaches were attempted, including seaweed seeding. We have been creating seaweed habitat for about seven years near the Phase 1 island, and about three years near the Phase 2 island. Also, by our efforts to promote greenery on the island, including ceremonial tree plantings and the expansion of flower spots, we are working to restore and protect coastal flora.

■ Protecting and restoring seaweed habitat, coastal flora

Encouraged by the results of monitoring the Phase 1 airport island seawall, KIX installed 3,200 seaweed-growing blocks (specially developed for this purpose) at five locations along the Phase 2 airport island seawall. To foster the quick formation of seaweed beds, seedlings were supplied by the placement of spore bags containing species such as *Sargassum filicinum* (*shidamoku* in Japanese) and *Eisenia bicyclis* (*kajime* in Japanese).

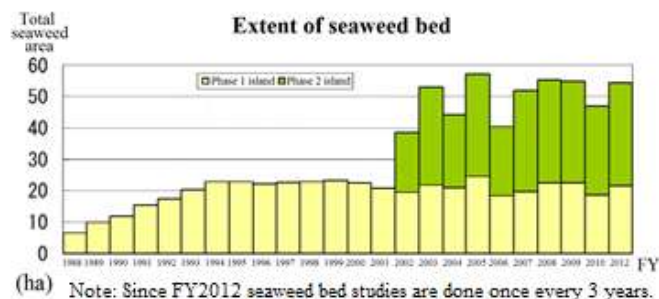


In addition, the transfer of 18 seaweed reef blocks with significant *Eisenia bicyclis* growth from the Phase 1 airport island seawall in March 2002 to six locations near the Phase 2 island provided a stable supply of seedlings for the core seaweed bed.

As a result of these seaweed projects, a survey in March 2013 found that the total area of seaweed beds around the Phase 1 and Phase 2 airport islands amounted to about 55 hectares, and *wakame* seaweed distribution was as shown in the figure below.

Note: Reference to “seeding by spore bags” refers to an initiative to actively supply spores by placing net bags (spore bags) into the sea containing large mature seaweed blades.

Rating	Coverage	Condition
Red	81~100%	Very dense
Orange	61~80%	Dense
Yellow	21~50%	Sparse
Light Yellow	5~20%	Spot by spot
White	Less than 5%	Traces only



■ Island greening projects

● Expanding the flower spots

We are making an effort to provide scenic views with “flower spots,” including the planting of tulips in a flower bed installed on the grass along the walking path in the international freight zone, and pansies on the way to Terminal 2 beside KIX Sora Park.



● Planting the “Smile Forest”

The previous year the Kansai International Airport CS Improvement Conference planted olive trees. This year, members held a planting ceremony in the Smile Forest. Hydrangeas were planted to show appreciation for Kansai International Airport celebrating its 20th anniversary, and Osaka International Airport its 75th, and to see more smiling faces.



● Coastal vegetation: restoration/protection

On the Phase 2 airport island, we have created an area for plants such as *Dianthus japonicus* Thunb. (*hamanadeshiko* in Japanese), *Lysimachia mauritiana* Lam. (*hamabossu* in Japanese), *Calystegia soldanella* (*hamahirugao* in Japanese) and *Vitex rotundifolia* (*hamagou* in Japanese) in order to restore and protect the shoreline vegetation of the Osaka Bay area.



■ Scenic improvement projects

● Green space at KIX Sora Park

KIX Sora Park is a large green grassy park near Terminal 2 where people can relax and enjoy picnics while watching aircraft take off and land. With the park is also the Sora Farm, which uses compost made from grass clippings from Osaka International Airport, as well as jogging and walking courses lined by sakura cherry trees along the inner waters between two parts of the airport island. In addition, the annual Dragon Boat Festival is held on the inner waters, where teams from not only Japan but around the world join in heated competitions, with the international airport as a backdrop.



● “Zero Waste” clean-up activities

Outdoor clean-up activities are conducted on May 30 each year, the same day when clean-up campaigns are held in neighbourhoods around Japan. Clean-up activities were also conducted after the Idling Prevention Campaign on June 5.



(5) An airport that coexists with the local region

We have cooperated with others' efforts to boost interactions with local communities, and have been pleased to have many people come to the airport island as a result of events and incentives here to create interest and excitement about KIX. To promote good relations with KIX, since fiscal 2002 we have been providing guest speakers and offering airport tours to introduce participants to the various kinds of work done at the airport.

We provide environment-related information via an environmental section on the KIX website. The Kansai International Airport Environmental Center, located in the Observation Hall, has been designed for communication with local communities, including the provision of a variety of environmental information. We will continue our efforts to convey information in ways that appeal to various audiences.

■ Provision of environmental information

Environmental information about KIX operations and projects is available on a dedicated section of our website. We provide environmental monitoring results from airport operations online and in our CSR reports, and also at the Environmental Center.

We have installed monitors in the terminal buildings and Observation Hall public area to display the status of electricity generation by photovoltaic panels (KIX Megasolar), and the public can see information such as electricity generated to date, as well as carbon dioxide emissions reduced, and the current sunlight intensity.



Making environmental information more visual.



NKIAC website
(environmental information)



NKIAC website (CSR Report)

■ Opportunities for environmental education

Environmental Center

In July 2011, we redesigned the display at the Center to show the airport's environmental initiatives on informative panels. In April 2012, we launched the "Professor KIXeco" quiz system, which lets users have fun while learning environmental information.

People can also experience actual sound levels and observe scenes of independent organizations that conduct noise analysis.



■ Dialogue with local communities

● Family Eco Classes

To give elementary school children from the third to sixth grades opportunities to enjoy learning about environmental and scientific topics relating to airports, Kansai airport conducts “Science Classrooms” every year. In “Hydrogen and Fuel Cell Classes” they learned about hydrogen energy, fuel cells, and other topics related to the Smart Island Vision.



● Guest speakers to local elementary schools, and environmental education at the KIX Sora Farm

To let older students of elementary schools learn about the Kansai International Airport and aircraft, we send guest speakers to schools, and welcome airport tours. In fiscal 2014, 1,681 students from 25 schools participated. Also, in June, we welcomed children from local elementary schools to the KIX Sora Farm, an eco-farm that grows crops with compost made at Osaka International Airport, so they could enjoy learning about the environment at a potato-harvesting event.

● KIX Airport Ekiden & Run

During the Smart Island Festival, the KIX Ekiden & Run event was held on October 4 (Saturday), to commemorate the 20th anniversary of Kansai International Airport and 75th anniversary of Osaka International Airport. (“Ekiden” is a popular type of long-distance relay race in Japan). The course for the event went through the green park along the inner waters of the Phase 2 island, with a turning point at the KIX Megasolar. Participation was open to the general public, and about 1,500 people participated, including spectators.



■ Cooperation with businesses associated with the airport

● Smart Island Council

The Kansai International Airport Smart Island Council was established as a body for the New Kansai International Airport Company and operators and businesses at the Kansai International Airport to work together on common objectives, including environmental protection and improvements. With 46 member businesses, the Council has conducted activities such as the vehicle Idling Prevention Campaign, the Zero Waste Campaign, Flower Spot plantings, and Good Practices Presentations. With the slogan of “Eco Action KIX: Small Actions Have Big Results,” the Council also aims to promote further efforts to reduce CO₂ emissions.



At the Good Practices Presentations in January 2015, presentations were made on the “Introducing Hybrid Cars to the Fleet” (Kansai International Airport Taxi Operators Council), and “Introducing CO₂-Free Hydrogen” (Kawasaki Heavy Industries). A presentation was also made on initiatives for “Complete Propagation of the Bluefin Tuna” (Kinki University Fisheries Restaurant). About 70 persons attended this event, and the participants listened intently.

● Environmental Liaison Committee for Major Airports in Japan

To tackle common issues and challenges, three companies (Kansai International Airport Land Co., Ltd., Narita International Airport Co., Ltd., Central Japan International Airport Co., Ltd.) and two additional companies (Japan Airport Terminal Co., Ltd., and Hokkaido Airport Terminal Co., Ltd.) jointly launched the Environmental Liaison Committee for Major Airports in September 2007. The Committee held a meeting in May 2014 for the exchange of information on topics such as the usage of ground power units, and initiatives to promote waste recycling.



● Trainees from Asia

In March 2015, KIX welcomed about 20 trainees from Asia in a training course conducted by the Overseas Human Resources and Industry Development Association (HIDA), introducing them to the environmental initiatives at the Kansai International Airport, and also to go on a tour of sites including the wastewater treatment center.



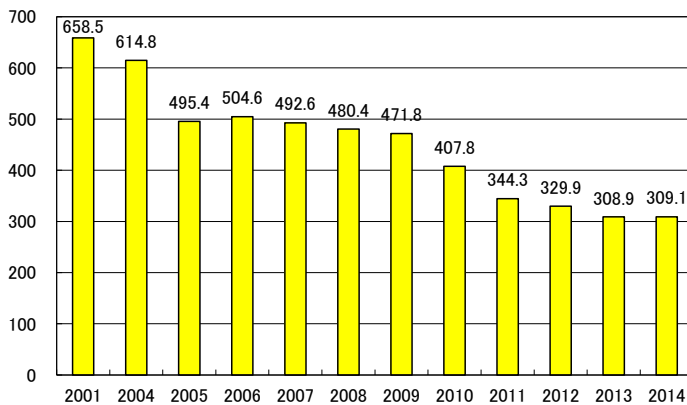
6. Environmental management at NKIAC offices

To reduce the environmental impacts of administrative functions at Kansai International Airport, NKIAC is working to reduce electrical, water, heat, and other consumption. In fiscal 2014, consumption was down in all categories compared to fiscal 2006, including electricity, heating and cooling, municipal water, gasoline, diesel, and office paper. The amount of waste disposed was also reduced.

NKIAC and group companies have been conducting the “Paper Diet Challenge” to significantly reduce paper consumption. It resulted in a 63% reduction in the amount of paper consumed, from 9.40 million sheets of paper before the campaign began in fiscal 2008 to 3.45 million in fiscal 2014 (5.95 million sheets less). In February 2010, we adopted “Green Purchasing Guidelines” and have been implementing green purchasing.

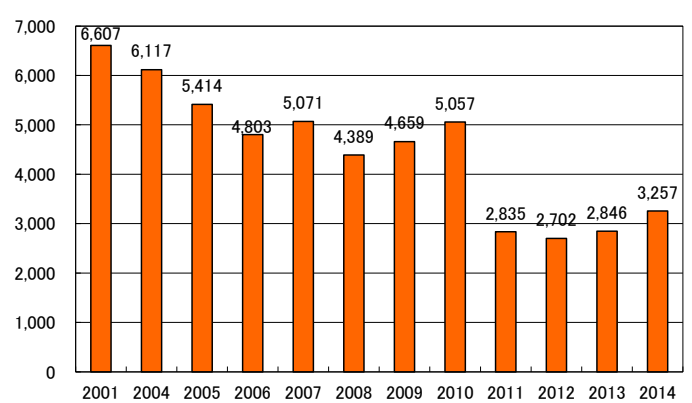
(1) Electricity consumption

1.96 million kwh
(38.7%) reduction



(2) Heating

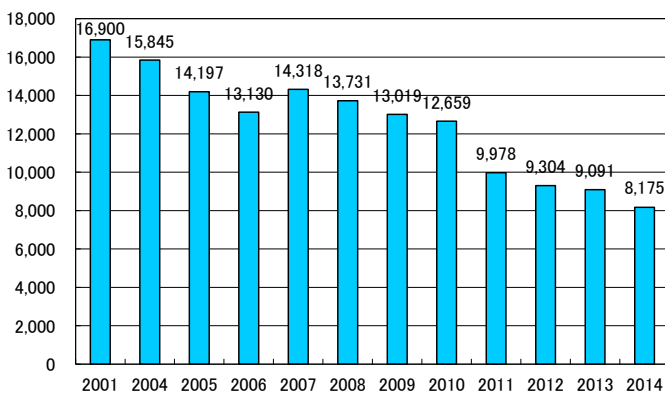
1,546GJ (32.2%)
reduction



Note: All figures are compared to FY2006

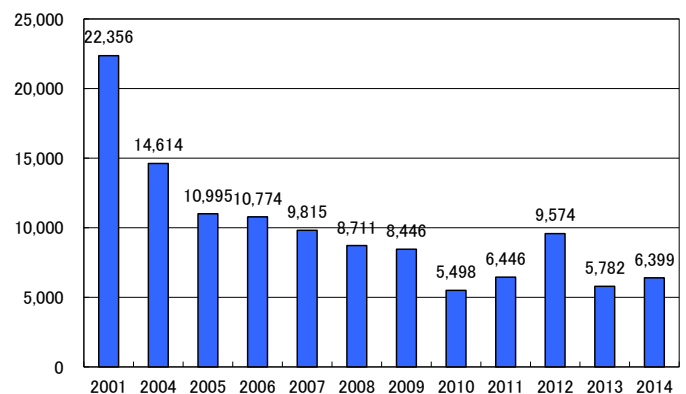
(3) Cooling

4,955 GJ(37.7%)
reduction



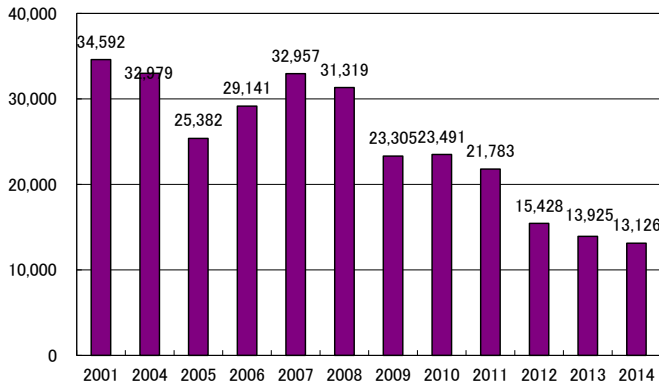
(4) Municipal water

4,37 5m³ (40.6%)
reduction



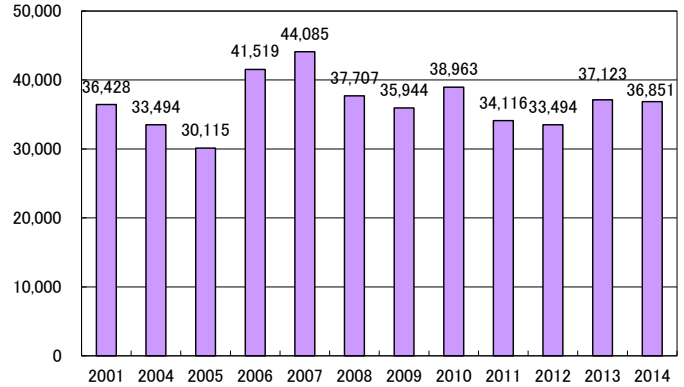
(5) Gasoline

16,015 L (55.0%)
reduction



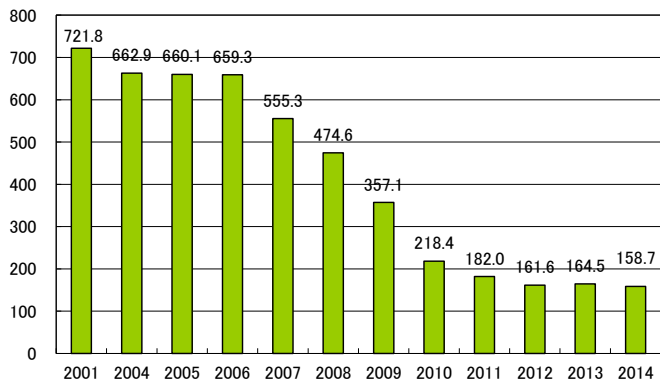
(6) Diesel

4,668 L (11.2%)
reduction



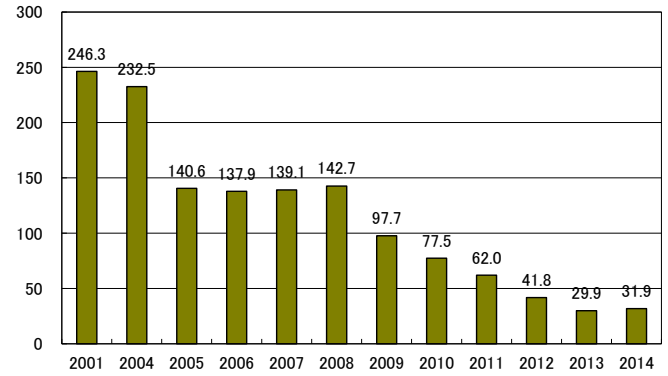
(7) Office paper

5.01 million sheets
(75.9%) reduction



(8) Waste

108 tons (76.9%)
reduction



Office Environmental Management Manual (adopted March 2001)

● Objectives

- (1) Reduce electricity consumption
- (2) Reduce municipal water consumption
- (3) Reduce energy consumption for heating and cooling
- (4) Reduce gasoline consumption
- (5) Reduce office paper consumption
- (6) Reduce waste, sort waste
- (7) Encourage green purchasing (environment-friendly products)
- (8) Introduce low-emission vehicles

7. Environmental performance data: (1) Environmental accounting

● Environmental accounting

Since fiscal 2002, we have been developing an environmental accounting system to evaluate the costs and benefits of our environmental initiatives, in order to further enhance their effectiveness and efficiency. The greatest cost for environmental protection would be the cost of building the airport on an artificial island five kilometers off the coast of the Senshu area to reduce the impacts of aircraft noise. However, as no methodology has yet been well-established to quantify the environmental benefits of reducing noise, our accounting efforts have focused on categories for which quantitative methods do exist, such as wastewater treatment and waste management.

Accounting method

- ◆ Scope of accounting: New Kansai International Airport Company, Ltd.
- ◆ Accounting period: April 1, 2014, to March 31, 2015
- ◆ Environmental cost categories: Based on “Environmental Accounting Guidelines 2005” (Ministry of the Environment), considering specific conditions of NKIAC.
- ◆ Environmental cost details:
 - Business area cost – Land costs related to incineration plant and sewage treatment plant; facilities costs; maintenance/facilities costs related to energy and water-conservation; other maintenance costs
 - Administrative costs – Environment-related social contribution costs, environmental studies

The total environmental protection costs in fiscal 2014 amounted to 4.038 billion yen, down 320 million yen from the previous year.

To calculate environmental benefits (based on physical quantities), for the wastewater treatment plant we chose total nitrogen (T-N) as a representative indicator for water quality and reduction of the pollution load flowing into Osaka Bay. For the incineration plant, as a representative indicator of environmental benefits we selected NOx from waste incineration from among other air pollutants. We then calculated the quantity of reduced environmental loads from the difference between legislated/regulatory standards and actual emission quantities, and attempted converting this to a monetary measure using an integrated coefficient based on LIME (see Note). The resulting environmental benefits (based on physical quantities) came to 13 million yen.

We estimated cost savings from environmental initiatives to be 917 million yen.

Note: “Life cycle impact assessment Method based on Endpoint modeling.” A methodology to integrate multiple environmental indicators into one in order to evaluate environmental benefits.

● Cumulative cost of environmental monitoring and studies

A total sum of about 8.6 billion yen has been spent on environmental monitoring and studies between the year the airport opened and fiscal 2014, including major areas of concern such as aircraft noise, flight paths and altitude, air quality, water quality, bottom sediment, and aquatic life. The figure includes the cost of maintenance and upgrading of monitoring facilities.

Accounting category		Cost (million yen)	
Business area costs	Pollution prevention	2,058	(2,093)
	Energy/water conservation	447	(627)
	Treatment/disposal of general waste	1,405	(1,501)
	Subtotal	3,910	(4,222)
Administrative costs	Social contributions relating to environment	12	(11)
	Environmental studies	116	(126)
	Subtotal	128	(136)
Total environmental costs		4,038	(4,358)

Figures in parentheses are for FY2013.
Note: Totals may not match due to rounding.

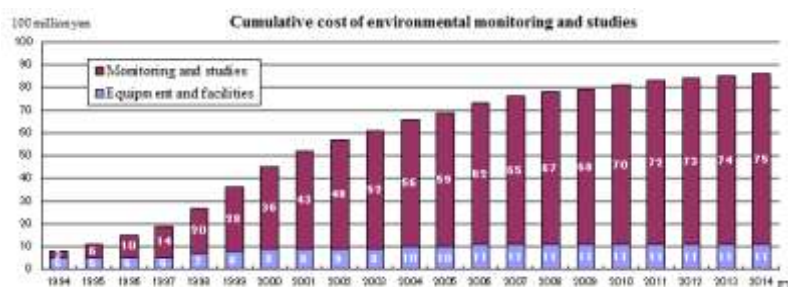
Environmental benefits

	Env. impact reduced	Monetary equiv.
Wastewater plant	T-N: 77.13 tons	6 million yen
	(T-N: 77.16 tons)	(6 million yen)
Incineration plant	NOx: 34.60 tons	6 million yen
	(NOx: 34.26 tons)	(6 million yen)

Figures in parentheses are for FY2013.

Savings (benefits) from environmental measures (all below in million yen)

1 Reduced municipal water use, due to reclaimed water use:	186
2 Reduced public sewage treatment fees due to treatment at KIX:	246
3 Reduced incineration costs off island due to incineration at KIX:	281
4 Reduced economic cost due to energy saving:	<u>205</u>
Total:	917



(2) Environmental performance data

Item	Units	Fiscal year												Compared to base year (FY2011)	Scope of data used	
		FY2003	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014			
Primary energy managed by KIAC																
Electricity consumption	(MWh)	119,772	116,404	115,577	113,079	114,743	110,000	106,740	104,717	102,270	102,872	104,801	104,098	1,828 MWh	(1.8%) Up	
Energy consumption for cooling	(GJ)	261,328	289,243	274,901	261,073	267,063	270,467	246,420	257,685	249,918	246,304	246,745	228,966	20,952 GJ	(8.4%) Down	
Energy consumption for heating	(GJ)	146,154	145,967	157,774	144,850	151,919	140,386	142,484	151,056	161,025	162,491	157,141	155,856	5,169 GJ	(3.2%) Down	
Natural gas consumption	(m ³)	154,637	139,110	151,495	147,364	142,277	131,792	127,824	125,902	111,204	108,591	120,932	277,213	166,009 m ³	(149.3%) Up	
Crude oil equivalent	(k l)	45,286	45,374	45,087	43,501	44,381	42,877	41,250	41,424	40,855	40,931	40,503	39,823	1,032 k l	(2.5%) Down	
Total greenhouse gas emissions from KIX																
Carbon dioxide (CO ₂)	(10,000 t-CO ₂)	—	—	—	54.4	57.1	52.6	41.1	41.2	42.7	45.2	46.4	48.5	5.8 _{10,000 t-CO₂}	(13.6%) Up	* Emissions from aircraft are calculated to include the airport's portion of the aircraft "landing and take-off" (LTO) cycle as defined by ICAO (movement of the aircraft between an altitude of 3,000 feet and the ground for both landing and take-off). * Emissions from vehicles are from vehicles operating within the restricted areas, and exclude through-traffic of trains, ships, and vehicles. ¹⁾
(per aircraft landing/takeoff)	(t-CO ₂)	—	—	—	4.65	4.40	4.07	3.79	3.86	3.96	3.51	3.48	3.35	0.61 t-CO ₂	(15.4%) Down	
Methane	(t-CO ₂)	—	—	—	361	406	424	357	351	354	420	435	472	118 t-CO ₂	(33.3%) Up	
N ₂ O	(t-CO ₂)	—	—	—	2,840	2,963	2,892	2,540	2,431	2,431	2,800	2,921	3,137	706 t-CO ₂	(29.0%) Up	
Total	(10,000 t-CO ₂)	—	—	—	54.8	57.4	52.9	41.4	41.5	43.0	45.5	46.7	48.9	5.9 _{10,000 t-CO₂}	(13.7%) Up	
(per aircraft landing/takeoff)	(t-CO ₂)	—	—	—	4.68	4.42	4.09	3.81	3.88	3.99	3.54	3.50	3.37	0.62 t-CO ₂	(15.5%) Down	
Concentrations, measures for air and water pollution																
Dioxins	(ng-TEQ/Nm ³)	0.024	0.090	0.048	0.20	0.00061	0.070	0.00097	0.19	0.04	0.00685	0.00905	0.00801	—	—	Concentrations in incineration plant emissions
Nitrogen oxides (Nox)	(ppm)	33	32	28	39	33	34	46	37	45	32	42	30	—	—	
Soot and dust	(g/Nm ³)	0.005	0.002	*	*	*	*	*	*	*	*	*	*	—	—	
COD	(mg/L)	8.6	9.4	9.6	8.1	10.8	9.6	9.2	12.5	8.6	9.2	10.3	9.0	—	—	Water quality of discharge from wastewater treatment plant
T-N	(mg/L)	1.1	1.4	2.3	1.9	3.5	1.7	2.4	3.9	3.7	5.1	6.0	5.6	—	—	
T-P	(mg/L)	0.030	0.12	0.084	0.084	0.19	0.15	0.1	0.1	0.1	0.1	0.1	0.1	—	—	
Waste disposal																
Total disposal – general waste	(t)	11,038	11,891	12,058	12,327	11,962	9,945	8,337	7,902	7,919	8,579	9,073	9,294	1,375 t	(17.4%) Up	Volume handled by incineration plant
Total landfilled – general waste	(t)	1,511	1,561	1,557	1,580	1,480	1,264	1,091	1,092	1,019	994	910	965	54 t	(5.3%) Down	
Quantity recycled	(t)	820	866	980	1,042	1,087	973	850	899	876	978	969	1,073	197 t	(22.5%) Up	
Water resources																
Municipal water supplied	(1,000 m ³)	1,007	1,056	1,039	1,020	1,049	964	828	849	812	805	749	678	134 _{1,000 m³}	(16.5%) Down	Amount supplied to airport island
Reclaimed water	(1,000 m ³)	477	540	540	576	505	415	337	403	407	401	431	477	70 _{1,000 m³}	(17.2%) Up	Volume handled by wastewater treatment plant
Wastewater treated	(1,000 m ³)	1,078	1,150	1,066	1,003	1,002	882	769	758	750	761	769	811	61 _{1,000 m³}	(8.1%) Up	
Wastewater discharged	(1,000 m ³)	541	563	475	389	438	392	365	315	315	329	322	311	4 _{1,000 m³}	(1.3%) Down	
Reference values for airport activity volume																
No. aircraft landings-takeoffs	(10,000 LTOs)	10.0	10.3	11.3	11.7	13.0	12.9	10.9	10.7	10.8	12.9	13.3	14.5	—	—	Overall measures of KIX operations
Air passenger traffic	(10,000 persons)	1,372.2	1,534.1	1,642.8	1,669.0	1,669.5	1,533.3	1,351.6	1,418.1	1,386.3	1,680.4	1,812.6	2,004.6	—	—	
Cargo volume	(10,000 tons)	78.6	85.6	84.3	80.2	84.7	72.6	63.4	75.0	71.2	68.7	67.1	74.1	—	—	

* Indicates below minimum measurement threshold

8. Chronology of environmental efforts

Year	Mo.	Event
1968	4	Ministry of Transport (MOT) launches basic study for airport siting
1971	10	Minister of Transport asks Council for Civil Aviation for advice on scale/siting for Kansai International Airport
	11	MOT conducts trial flights to study noise levels at 3 candidate sites (Senshu, Kobe, Akashi)
1972	8	Council for Civil Aviation (Kansai International Airport committee) conducts hearings with local communities
1973	8	MOT surveys 3 candidate sites commercial aircraft air pollution
1974	8	Council for Civil Aviation reports initial findings to Minister of Transport: Optimal airport location is off coast of Senshu
1975	9	MOT convenes series of briefings in communities
1976	9	MOT announces Survey Implementation Guidelines
1977	10	Marine observation facilities completed
1978	2	MOT announces plans for noise, vibration, and air pollution studies, starts site studies
	3	MOT begins bore studies near candidate sites
1979	5	MOT conducts flight studies with aircraft
1981	5	MOT presents three reports: Airport Proposal, Environmental Impact Assessment, and Approaches to Regional Infrastructure
1983	12	MOT begins ground improvement testing off the coast of Senshu
1984	10	Kansai International Airport Co. (KIAC) established
1986	2	Kansai Int'l Airport Env. Monitoring Org. established (Osaka Pref. Governor, mayors of 9 cities, 4 towns currently)
	6	Environmental Impact Assessment submitted to governor of Osaka Prefecture
	12	Environmental Monitoring Plan adopted environmental monitoring begins
1987	1	Permit obtained for land reclamation on public waters for Phase 1 construction. Phase 1 construction begins
	6	Construction begins on bridge linking mainland to airport begins, KIX Environmental General Center opens
1989	6	Phase 1 airport island seawall construction completed
1994	1	Phase 1 airport island construction areas completed
	3	Plan for Environmental Monitoring of KIX Construction/Operation adopted
	7	Kansai International Airport Environmental Center opens
	9	Kansai International Airport (KIX) opens for service (Sep 4). Monitoring begins: Aircraft noise, low-freq. air vibration
1995	8	Council for Civil Aviation releases Basic Approach to 7th Airport Preparatory 5-Year Plan (mid-term report)
1996	6	Kansai International Airport Land Development Co. (KALD) est., designated by Min. Transport as official land developer
1997	6	MOT releases "Comprehensive Initiatives relating to Flight Path Issues at KIX" paper
1998	10	Environmental Impact Assessment on Phase 2 Construction submitted
	12	New flight paths introduced. Environmental Monitoring Plan for aircraft noise, etc., reviewed, monitoring enhanced
1999	6	Environmental Monitoring Plan for Phase 2 Construction Project adopted
	7	Permit obtained for land reclamation on public waters, Phase 2 construction (start Jul 14. Silt protection sheets deployed
	11	KIX International Symposium marks fifth anniversary of opening
	12	KALD acquires ISO 14001 certification for environmental management system
2001	1	KIAC establishes Environmental Management Committee.
	4	KIX receives "Monument of the Millennium" award from American Society of Civil Engineers, as offshore airport
	6	KIAC adopts Environmental Management Plan (Eco-Island Plan)
	9	Placement begins for wave-dissipating blocks to support seaweed bed growth along Phase 2 seawall
2002	11	International Airport Symposium 2001 hosted, Phase 2 airport island seawall completed
	10	KIAC adopts Regulations Governing the Use of Waste Processing Facilities
	12	KIAC establishes Energy Conservation Committee
2003	12	KIAC releases first Eco-Island Report (2002 edition)
	12	KIAC establishes KIX Customer Satisfaction Council
2004	9	International Airport Symposium 2004 hosted
2004	12	KIAC, KALD mount their first display at "Eco-Products 2004" exhibition
2005	7	Kansai International Airport Environmental Center relocated to Kanku Observation Hall
2006	8	Kansai International Airport & Rinku Town designated by government as CNG vehicle model project areas
2007	1	KIAC awarded Min. Economy, Trade & Industry Award at FY2006 Nat'l Energy-Efficiency Best Practices Conference, for
	5	JHFC hydrogen charging station for vehicles opens at KIX
2008	3	KIX Eco-Island Promotion Council launched
	3	KIX Environmental Plan adopted
	4	Windbreak fence completed for KIX rail system access bridge, use of pro-beam low-location lights begins
	5	Kanku Environmental Exhibition features KIX Environmental Plan
	6	First idling-prevention awareness campaign launched
	7	First conference held to report on KIX Eco-Island Promotion Council environmental initiatives
	10	Study tour organized by KIX Eco-Island Promotion Council
	7	Full-scale use of truck-mounted ground power units (GPU) begins
2009	11	KIX Science Classes held
	1	Partial changes to aircraft auxiliary power unit (APU) usage restrictions (use reduced from 30 to 15 min. before departure)
2010	9	Photovoltaic system installed for temperature-controlled building for medical products
2011	1	IATA Environment Stand display installed at KIX
	3	Rapid charger installed at KIX for electric vehicles
	7	Japan fully adopts digital terrestrial broadcasting: measures targeting signal interference end
	9	Electricity-powered commercial shuttle vehicles introduced (two vehicles by fiscal year end)

Year	Mo.	Event
2012	4	New Kansai International Airport Company (NKIAC) established
	5	KIX wins judges' special award, Airports Council Int'l (ACI) Asia-Pacific 2011 Green Airports Recognition Awards
	6	Phase 2 airport island construction almost completed, land development work by KALD is completed
	7	Kansai International Airport and Osaka International Airport are merged
	8	KIX earns runner-up award in 2012 Osaka Environmental Awards for efforts to grow seaweed beds
	10	KIX Sky Park opens adjacent to Phase 2 Terminal Building, trial begins for hydrogen fuel cell buses
	11	Olive tree planting ceremony along walking path for Phase 2, decision made to do KIX Megasolar project
2013	2	Display at Eco-Products 2012, and four regular chargers installed in parkade for electric vehicles
	2	Int'l Strategy Comprehensive Special Area expanded by Kansai Innovation to include KIX (green innovation theme)
	3	Smart Eco Logi Council holds ceremony for launch of 20 large CNG trucks in international freight zone
	3	KIX Eco-Island Promotion Council changes name to KIX Smart Island Council
	4	KIX Smart Island Plan adopted
	8	Summer Vacation Family Eco Classes held
	10	East Asia Airport Alliance (EAAA) annual general meeting held. "Environmental Relay Declaration" adopted
2014	12	Display at Eco-Products 2013 exhibition. Also, held Winter Vacation Family Eco Classes
	1	KIX announces event for EAAA Environmental Relay
	2	KIX Megasolar starts generating electricity (largest photovoltaic system of any Asian airport)
	5	Hydrogen Grid Project launched
	6	Rapid charger installed for electric vehicles at open parking lot No.5, with 24-hour operations
	7	"Megasolar Observatory" and "Visualization Monitor" start operating
2015	7	Small wind turbine power generator installed—a first for any Japanese airport
	2	Trial operations launched for first fuel cell-powered forklift at any airport in Asia, plus demonstration trial of hydrogen grid

□ Notes

1. Lden (day-evening-night equivalent level)

An indicator for measurement for environmental quality standards to measure aircraft noise, in use since fiscal 2013. Units are in decibels (dB). (Previous indicator was WECPNL.) Under the environmental quality standards, a maximum Lden 57 dB (WECPNL 70) applies to exclusively residential areas, and a maximum of Lden 62 dB (WECPNL 75) applies to other areas where normal living conditions need to be protected.

2. Transitioning to quieter aircraft

KIX made an effort to move toward quieter aircraft by instituting a complete ban starting in April 2002 on flights by any aircraft not complying with Chapter III of the Convention on International Civil Aviation, Annex 16 (Environmental Protection) on aircraft noise standards of the International Civil Aviation Organization (ICAO).

3. Quieter flight procedures

Noise-reducing flight procedures for aircraft, including delayed use of flaps and delayed deployment of landing gear on approach to the runway.

4. Continuous descent operations (CDO)

A method of aircraft flight during descent, maintaining the minimum engine thrust for optimal descent (not horizontal flight) until the aircraft reaches the starting point for instrument landing. Benefits of the method include reduced fuel consumption and reduced CO₂ emissions.

5. Air heater used to prevent white smoke

An air heater is used to reduce moisture content in emissions by introducing heated air into the flow, to ensure that white smoke being emitted from exhaust stacks does not reduce visibility for aircraft or the control tower.

6. GPU (ground power unit)

Stationary or mobile equipment/facilities that supply air conditioning or electricity to parked aircraft. The use of GPUs can reduce the amount of fuel consumption by aircraft onboard auxiliary power units (APUs).

7. AIP

Aeronautical Information Publications (AIP) contain essential information for aircraft operation. In Japan they are compiled by the Civil Aviation Bureau (Ministry of Land, Infrastructure, Transport and Tourism).

8. Restricted areas

Runways and other landing/takeoff areas, taxiways, aprons, and other areas where entry has been restricted by signage.



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