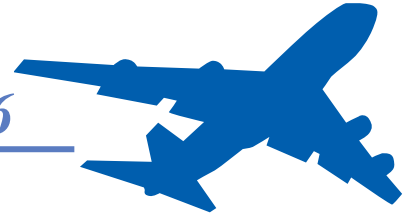


24時間、こころ動かす空港

**KIX**  
KANSAI INTERNATIONAL AIRPORT

**Kansai International Airport**  
**Smart Island Report**

*2016*





## About this Smart Island Report

The “KIX Smart Island Report 2016” is a report with detailed data on the environmental initiatives conducted in fiscal 2015, and the categories of policy and measures described herein correspond to the Third Environmental Plan (“Smart Island Plan”) adopted in April 2013.

This report describes the initiatives of the New Kansai International Airport Company, Ltd. and KIX Smart Island Council in fiscal 2015. Please note that as the operating company of the airport as of April 2016, Kansai Airports has taken over the work of report publication.

### 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”).

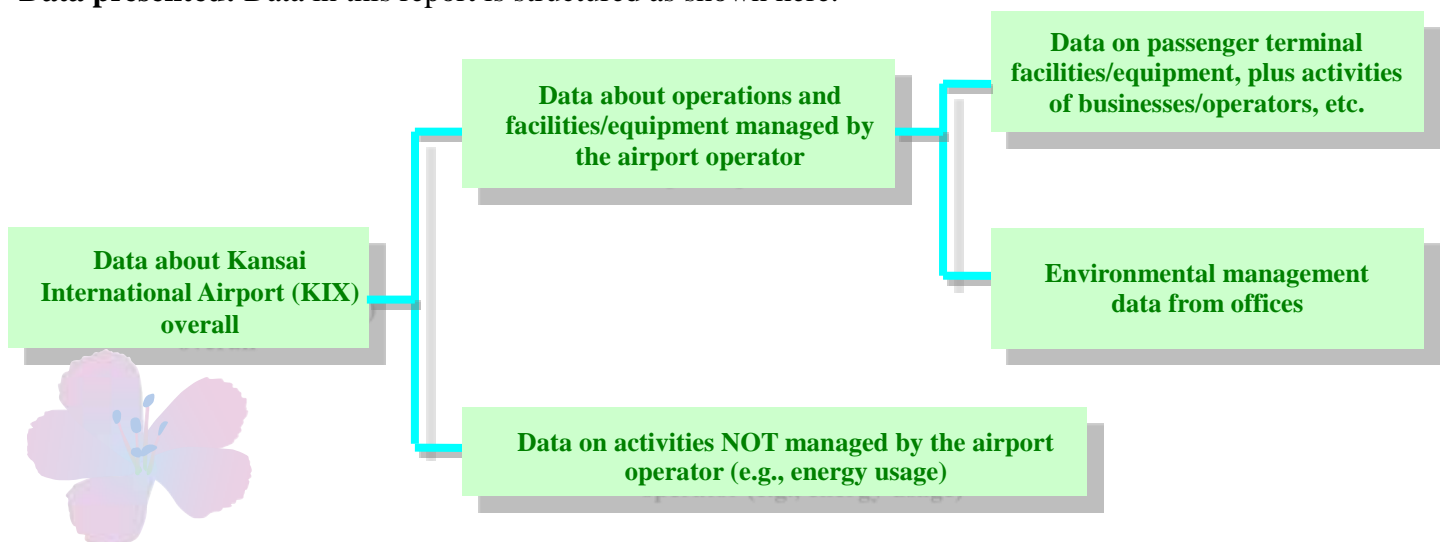
With the start of service of Runway B (August 2007), the Kansai International Airport Environmental Plan was adopted in March 2008, and we have been working since then to reduce environmental impacts from airport-related operations, and also to reduce impacts on the region around the airport.

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 includes activities of businesses operating on the airport island that are members of the KIX Smart Island Council.

**Data presented:** Data in this report is structured as shown here.



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# 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 airport operator 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 airport operator is to advance and manage (review and improve) the Plan through the internal 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 are 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**

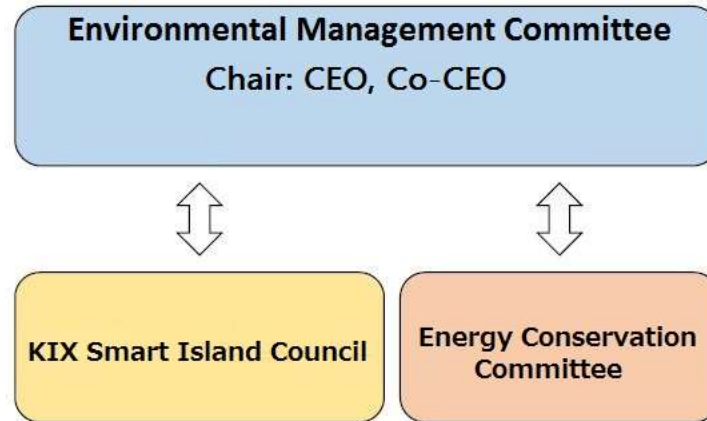


- |  |  |
|--|--|
| <p><b>1. An airport that respects the local environment</b></p>  | <p>Continue to comply with environmental standards for aircraft noise and work to further reduce noise levels. Work to protect the environment by not only meeting government regulations for air and water quality, but also by setting our own voluntary standards that are even more stringent.</p>   |
| <p><b>2. An airport that respects the global environment</b></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><b>3. An airport that recycles resources</b></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><b>4. An airport that respects biodiversity</b></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><b>5. An airport that respects the local community</b></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 airport operator advances and manages (reviews and improves) the Plan through the internal 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.



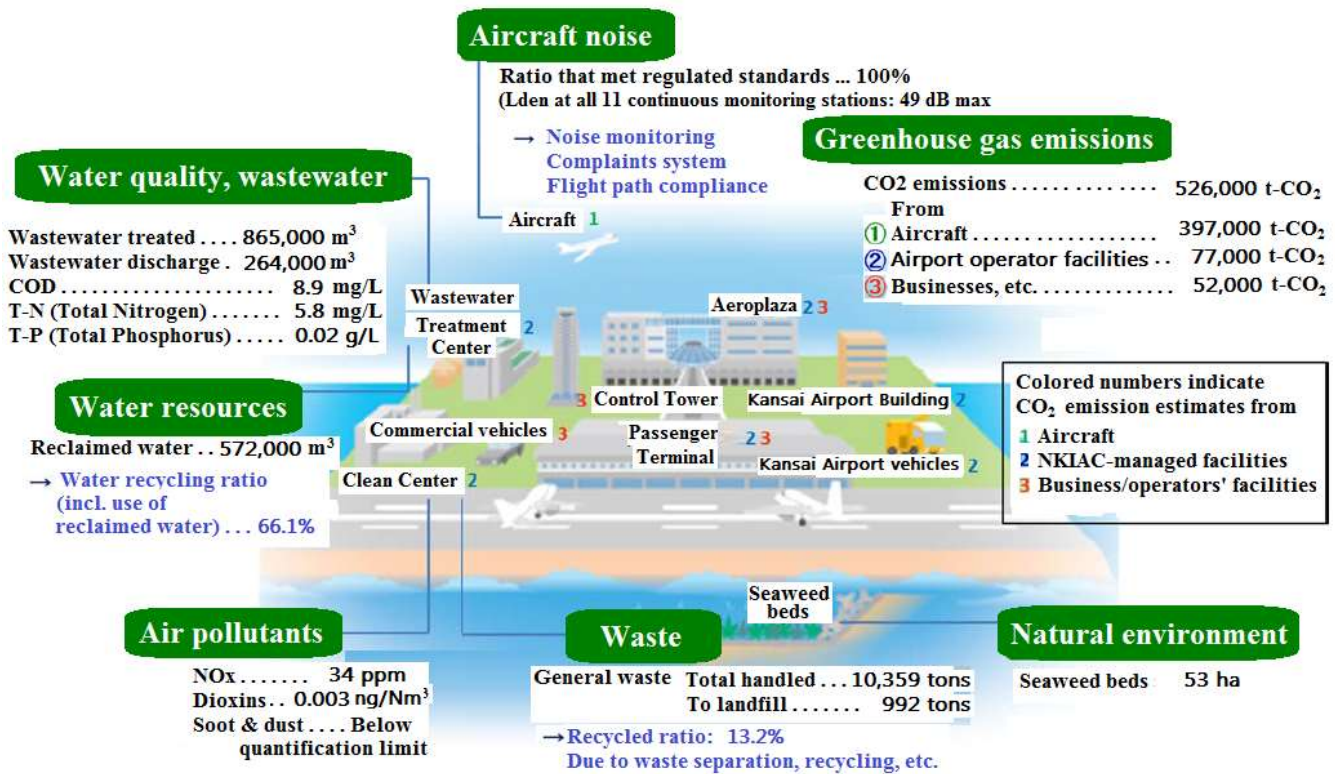
### ■ Environmental monitoring system

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.

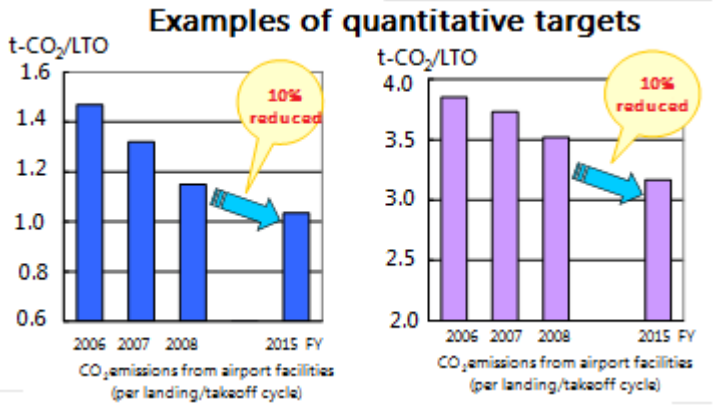




### 3. Fiscal 2015 environmental data overview



**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.



## 4. Major measures, targets, and achievements

|   | Item  | Objective   | FY2015 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.   |       |      |
|   | Air quality protection  |   |   | • Requested KIX Airline Operations Council (AOC), etc., to observe proper flight paths.  |       |      |
|   | 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)       | • 34 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<br>Daily COD load never to exceed 30 kg/day (1/6th the level predicted by environmental impact assessments) | • COD daily average 8.9 mg/L<br>• Daily COD load 8.9 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.<br>• 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)   | • Conducted "Energy Conservation Patrols," removed some lights to reduce lighting, adjusted air conditioning settings, etc.<br>• In FY2015, converted to LED lighting in parkade, airport station concourse and Aeroplaza, installed high-efficiency motors in baggage handling system, etc.           | 😞     | 12   |
|   | Promote energy-efficient operations   | 1% average annual reduction in energy intensity of operations managed by the airport operator             | • Average 2.8% annual reduction for the period FY2011-2015<br>• Average 0.055 kl/m <sup>3</sup> from FY2011-2015<br>• For FY2015 it was 0.053 kl/m <sup>3</sup>   |  | 😊     |      |
|   | 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            | • 16.2% reduction (reduced from 2.80 tons in FY2011 to 2.34 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 90%)  | • GPU usage ratio of 81.1%  | • 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 CO <sub>2</sub> emission load. | 😞     | 14   |
|   | Idling prevention awareness campaigns   | Appeal/request, best effort.  | • Installed signage in parking areas. • Displayed posters from Osaka Prefecture on airport island.<br>• KIX Smart Island Promotion Council conducted intensive stop idling campaign on June 9, 2015.  |  | 😊     | 15   |
|   | Promote public transportation   | Appeal/request, best effort.  | • Replaced 28 buses in FY2015.  | • 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  | • Reduced 34.7% (reduced from 1.17 tons/LTO in FY2011 to 0.76 tons/LTO)                                   |   | 😊  | 13    |      |
|   | Reduce plastics content 10% or less   | • Plastics content 18.5% of garbage brought to airport island incineration facility.                      |   | 😞  |       |      |

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   | FY2015 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 Kansai Airports car sharing vehicles | • Fleet ratio 56.3% (9/16 vehicles)   | • Introduce eco-cars when replacing Kansai Airports car-sharing vehicles.  | ☹️    | 16   |
|  |  | Eco-car ratio 80% (commercial vehicles used on island)  | • Fleet ratio 20.7% (378/1,829 vehicles)  | • Encourage businesses operating on island to introduce eco-friendly vehicles.   |       |      |
|  | Promote introduction of eco-cars                             | Trial use of hydrogen fuel cell vehicles, as appropriate.   | • As part of demonstration trial selected by Ministry of Environment in February 2015, launched the first-ever trial operation of a fuel cell-powered forklift at an Asian airport.<br>• In January 2016, installed large hydrogen fueling station on Phase 2 airport island, as part of hydrogen grid project.   | • Encourage businesses operating on island to introduce eco-friendly vehicles.   | 😊     | 16   |
|  |  | 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)<br>• Now conducting trial operation of hydrogen-powered vehicles, using hydrogen fueling stations (installed May 2007, January 2016) 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, January 2016) on airport island. (Repeated)<br>• 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 four regular chargers each in two parkades (P1 and P2) in Dec. 2012 (total 8). 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 8.3% locally generated  | • Launched operation of KIX Megasolar in Feb. 2014, and launched operation of new megasolar in September 2015.<br>• Installed small wind turbine in Sora Park on Phase 2 island in September 2014, and two units in February 2016. | ☹️    | 18   |
| Use clean energy   |  |   |   |  |       |      |
| (3) An airport that recycles resources                   | Achieve zero emissions                                       |   |   |  |       |      |
|  | Reduce general waste volume. Recycle resources.              | 13% recycling rate for general waste  | • Recycling ratio 13.2%   | • Issued rules for waste separation in "Regulations Governing the Use of Waste Processing Facilities."<br>• Introduced separated waste collection by airline companies for garbage from aircraft.                                  | 😊     | 19   |
|  |  | 80% reduction (compared to FY2008 actual results)   | • Reduced 29%   | • 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 soil/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 45% (from 7.5 to 4.1 m <sup>3</sup> /LTO)  | • 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: 66%  | • 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  | FY2015 achievements   | Description   | Rated | Page     |
|--|--|--|---|---|-------|----------|
| <b>(4) An airport that respects biodiversity</b>       | Natural environment  |  |   |   |       |          |
|  | Protect/grow seaweed beds, coastal vegetation  | Maintain seaweed beds. Aim for 20% increase above FY2010 (was 47 ha).  | Seaweed habitat, area: 53 ha (studied Mar. 2016), 13% 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. |  |   |   |       |          |
| <b>(5) An airport coexisting with the local region</b> | 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.<br>Installed monitors showing electrical generation of solar panels (KIX Megasolar), visually displaying environmental information<br>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 (28,257 visitors in FY2015)<br>Held environmental events in August 2015 on theme of environmentally-advanced airport, including science classes on theme of hydrogen and fuel cells.<br>Provided guest speakers and airport tours for primary school students (18 schools in FY2015). |   |       | 24<br>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.<br>In September 2014, attended the 4th ACI Asia-Pacific Regional Environment Conference, and reported on clean energy initiatives of Kansai International Airport.<br>In March 2016, hosted trainees (approx. 20 persons) from Asia, to introduce them to KIX environmental initiatives, and visit the incineration plant (Clean Center). |   |   |       |          |

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.

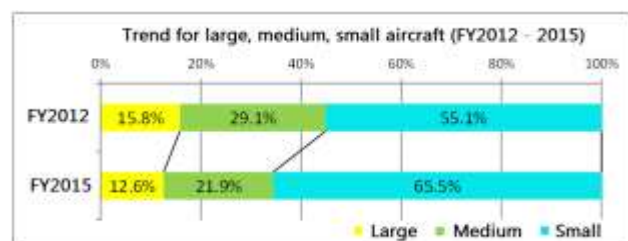
KIX conducts both continuous and periodic monitoring of aircraft noise, and publishes the findings. For fiscal 2015, as in the prior year, noise levels complied with environmental standards (maximum Lden 57 dB, see Note 1) at all land-based continuous monitoring stations and periodic monitoring sites.

○ FY2016 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).
- Our 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

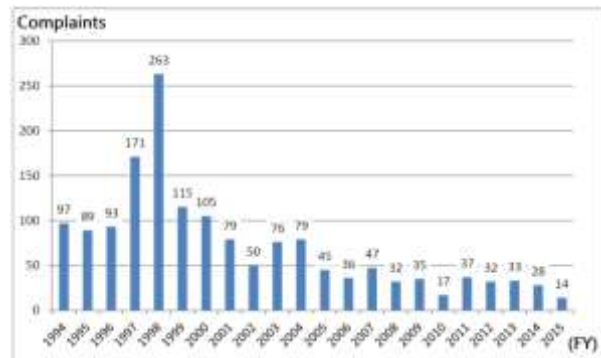
Kansai Airports

Technical Department, Smart Island Group

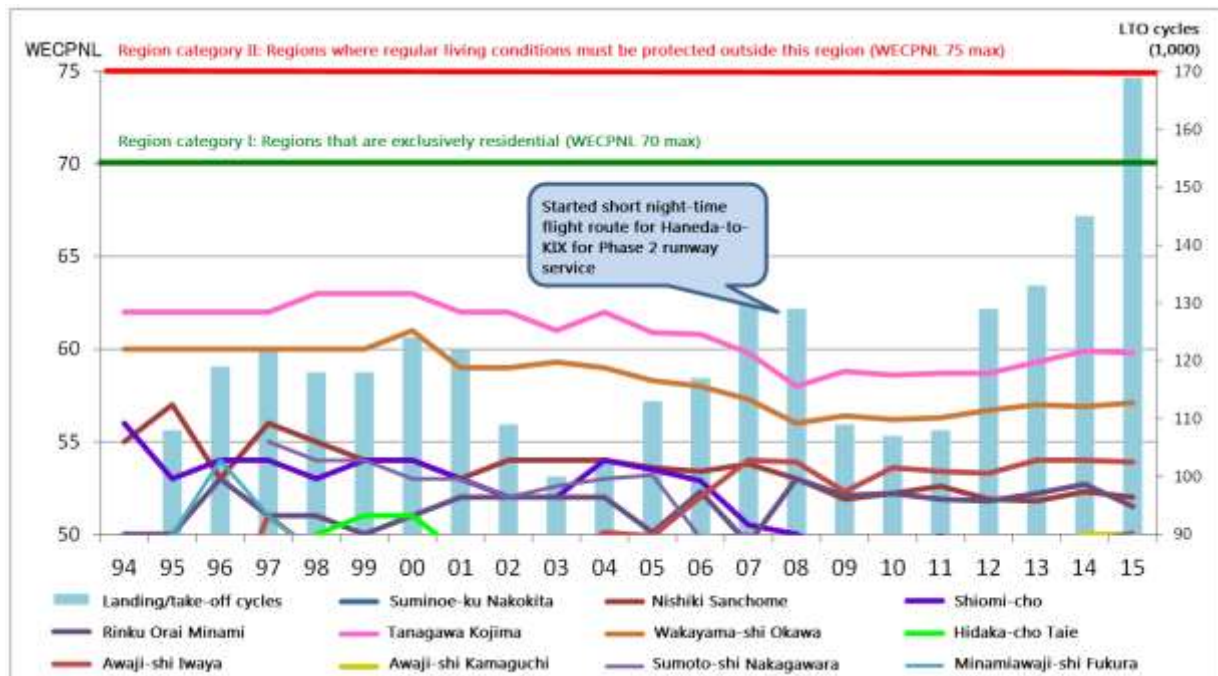
Tel: 072-455-2177 (weekdays 9:00 am to 6:00 pm)

KIX Airport Information Center

Tel: 072-455-2500 (nights and holidays)



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

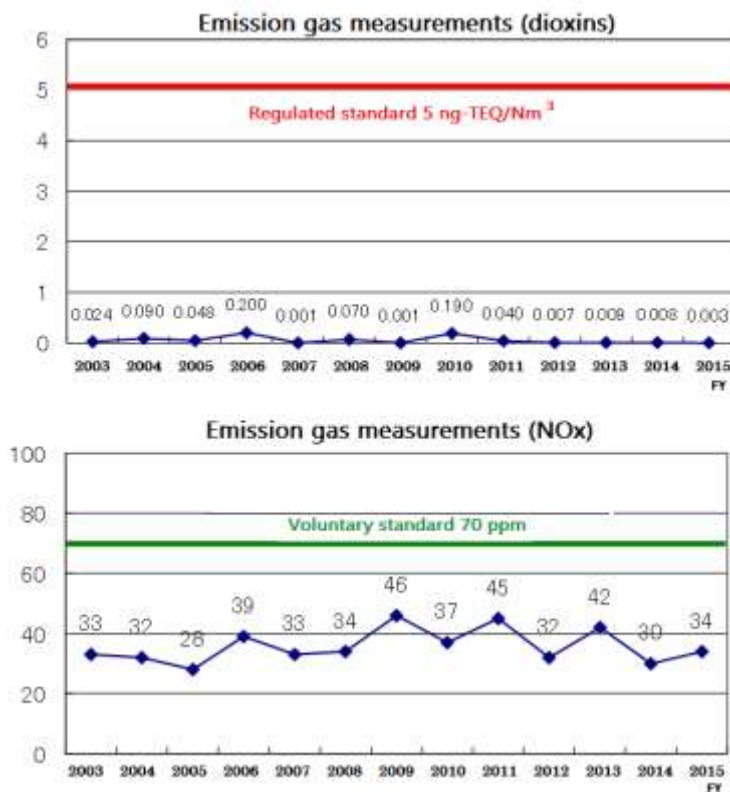


#### Notes:

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.
3. WECPNL 50 or less: Shiomi-cho (2009-2010, 2012-2015), Awaji-shi Iwaya (1994-1996, 1998-2003), Awaji-shi Kamaguchi (1998-2013), Sumoto-shi Nakagawara (2008-2013), Minamiawaji-shi Fukura (1994, 1998-2015), Hidaka-cho Taie (2001-2015) (all fiscal years)
4. Nishiki and Fukura (1994-97 scheduled monitoring), Iwaya (1994-96 scheduled monitoring), Nakagawara (started continuous monitoring in 1997), Nankokita (same: 1998), Kamaguchi (same: 1998)



## ■ Measures to reduce emissions from incineration plant (Clean Center)



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/Nm<sup>3</sup>, 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.kansai-airports.co.jp/efforts/environment/kix/monitoring/clean.html>



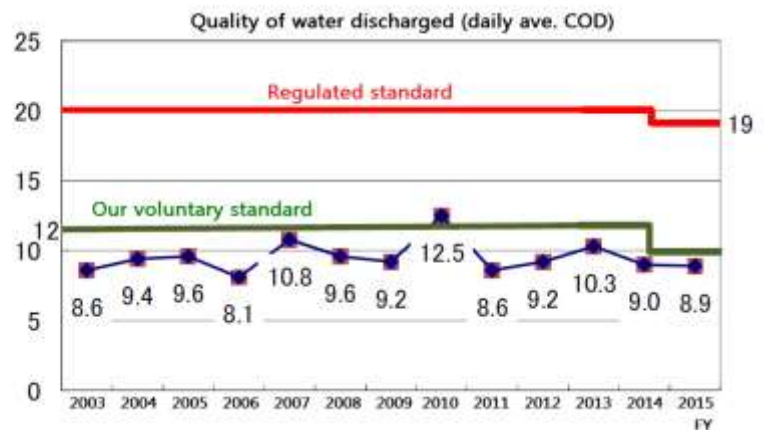
Incineration plant (Clean Center)



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.

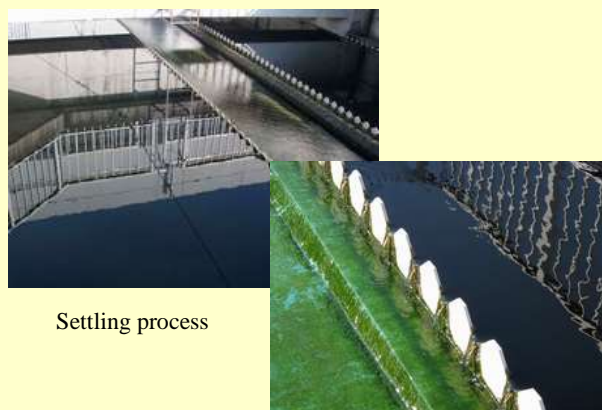
Treatment capacity

General wastewater 10,050 m<sup>3</sup>/day  
Special wastewater 3,300 m<sup>3</sup>/day

In fiscal 2015, average processed volumes were 2,151 m<sup>3</sup>/day of general wastewater, and 213 m<sup>3</sup>/day of special wastewater.



Wastewater treatment plant



Settling process



## (2) An airport that respects the global environment

Through our Energy Conservation Committee, KIX is working to advance various energy efficiency initiatives at the airport. For internal operations we are also promoting efforts such as green purchasing, energy conservation, and going paperless. We are also working to reduce CO<sub>2</sub> 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.

### ■ Energy conservation

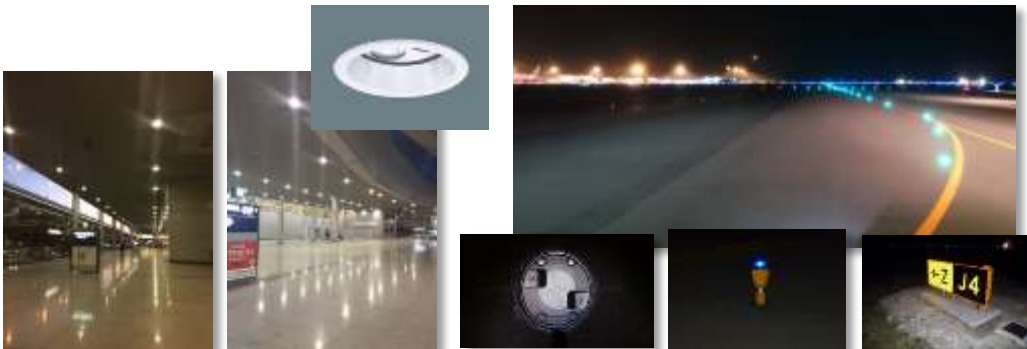
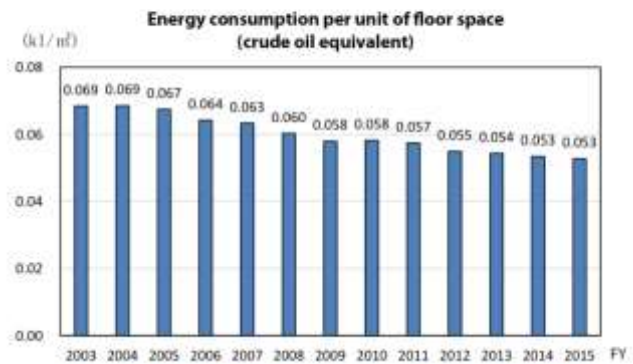
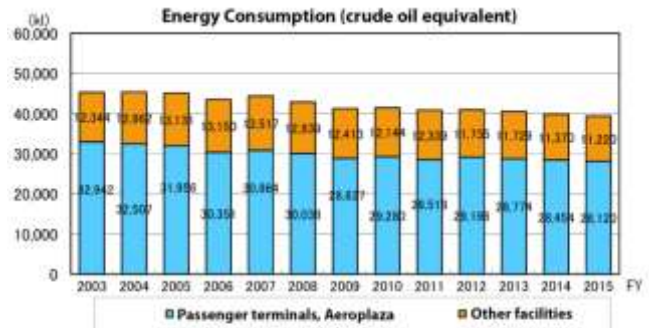
Since our Energy Conservation Committee was established in fiscal 2002, it has been engaged in investigating, analyzing, planning, and taking actions to conserve energy.

Current initiatives include increasing the efficiency of facilities, and in fiscal 2015 lighting in the parkade and airport station concourse, Aeroplaza building, and other areas was converted to LEDs (2,550 fixtures). With other energy-saving measures, including conversion to high-efficiency electrical motors for the passenger luggage handling system, the initiatives implemented by the end of fiscal 2015 are reducing CO<sub>2</sub> emissions by about 600 tons annually.

While the number of aircraft take-offs and landings is increasing, energy consumption is on a decreasing trend.

In addition, with taxiway improvements associated with the Phase 2 island terminal, by using LED lamps for airport lighting—including 664 LED units for taxiway center line lights, taxiway edge lights, and taxiing guidance signs—we are aiming to reduce energy consumption by 70% to 90% compared to the use of conventional halogen bulb lighting.

In recognition of these energy conservation efforts in a variety of airport facilities, KIX was awarded the 2015 Kansai Eco Office Grand Prize from the Union of Kansai Governments.



Kansai Eco Office Grand Prize certificate

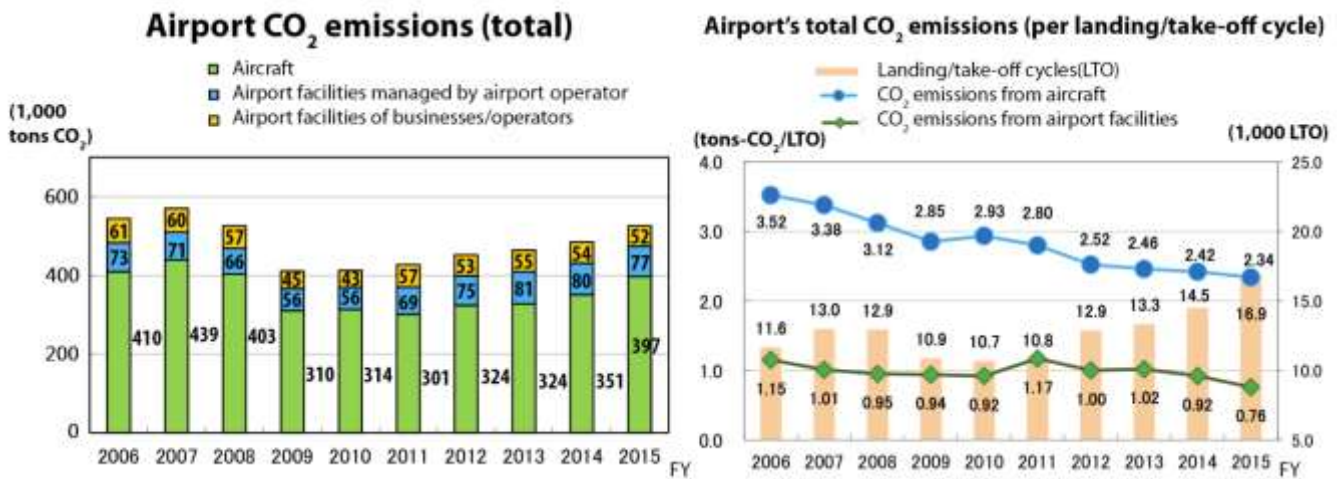
LED lighting (parkade-airport station concourse)

LED equipment used for airport lighting

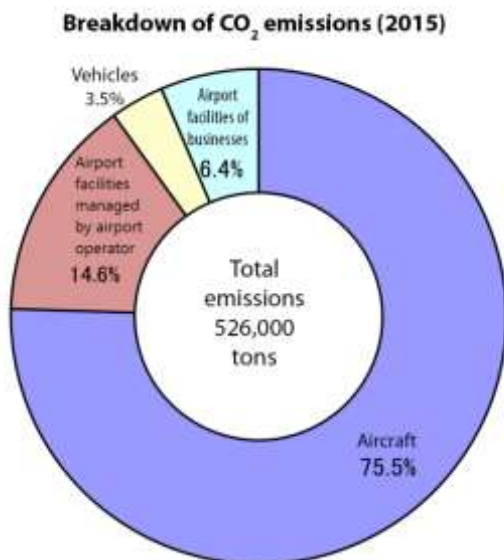
## ■ Reducing greenhouse gas emissions

The CO<sub>2</sub> emissions from operations at KIX amounted to 526,000 tons in fiscal 2015. This represents an increase of about 8.5% over the previous year, but CO<sub>2</sub> emissions per aircraft landing and takeoff cycle are declining. 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. CO<sub>2</sub> emissions from airport facilities managed by the airport operator and by businesses are unchanged or have declined due partly to the benefits of greater energy efficiency. The largest share of CO<sub>2</sub> emissions is from aircraft, at 75.5% of the total, followed by 14.6% from passenger terminals and other airport facilities.

In terms 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. CO<sub>2</sub> 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.

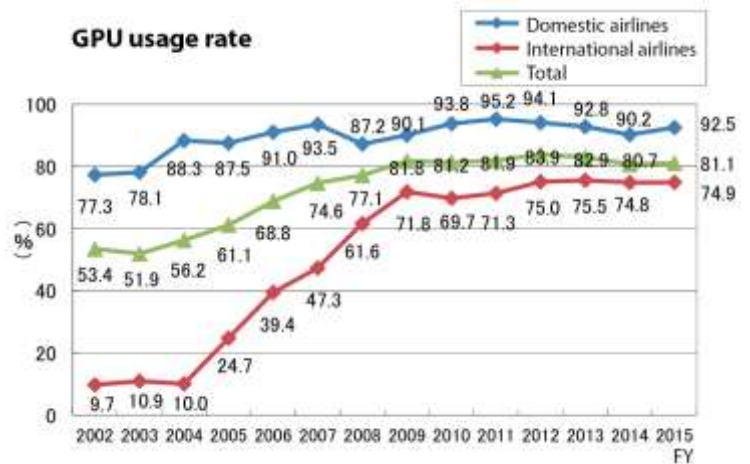
■ Promoting the use of ground power units (GPUs) (See Note 6)

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

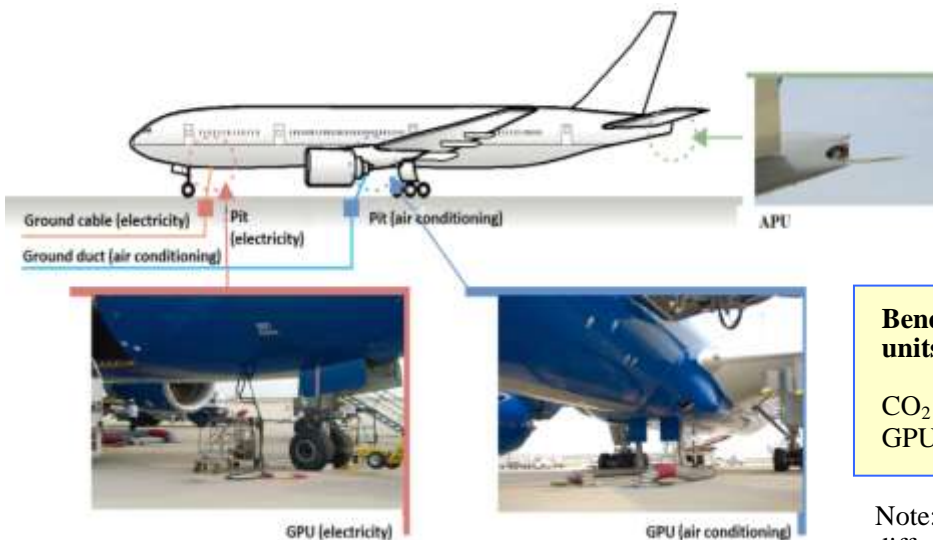
To reduce air pollution from APUs, we have installed ground power units (GPUs) to provide electricity and air conditioning to aircraft parking spots, and are asking airlines at KIX to use them.

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 2015 the ratio of GPU usage (including mobile units) was 81.1% overall (0.4% more than the previous year).



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.



**Benefits of using ground power units at KIX:**

CO<sub>2</sub> emissions reduced by the use of GPUs in FY2015: **48,000 tons**

Note: Reduction is calculated as the difference between CO<sub>2</sub> emissions from GPU use and the emissions that would have occurred if only APUs were used.

Airlines with 100% usage ratio (including other companies' GPUs) in FY2015

This is the summary for 8 Japanese airlines and 55 international airlines, totaling 63 airlines. The following four airlines had a GPU usage ratio of 100% in fiscal 2015 (used GPU for all 12 months of the fiscal year): Air Caledonia, Air France, Federal Express, Xiamen Airlines (alphabetical order).

For Notes 6 and 7, please see page 32.



## ■ Idling prevention awareness campaigns

To reduce the idling of vehicles, we display signs and posters in parking lots to discourage idling, 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 9 in 2015).

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.

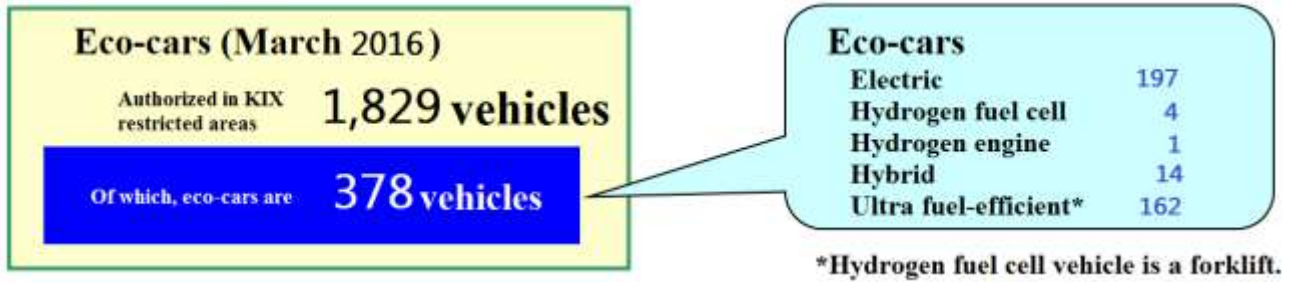


Scenes of the idling prevention campaign, asking drivers to cooperate



## ■ 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 378 of the vehicles authorized to operate inside the restricted areas (Note 8) at the KIX airport; 197 of them are electric vehicles. (Eco-cars are 20.7% 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 added the world's first commercially-marketed hydrogen fuel cell vehicle to our fleet—a Toyota Mirai.

In January 2016, as part of our hydrogen grid project, we installed a large hydrogen fueling station on the Phase 2 airport island. This is the first commercially hydrogen station at an airport in Japan, and is a large-scale station. The station can refill hydrogen not only for fuel cell vehicles, but also in the future, it will be able to serve KIX airport shuttle buses, limousine buses and other vehicles operating on fuel cells.



Large hydrogen fueling station (Phase 2 airport island) and a hydrogen fuel cell car (Toyota Mirai)



Previous demonstration trial  
(car powered by hydrogen engine and fuel cell bus)

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).



EV regular charger in parkade



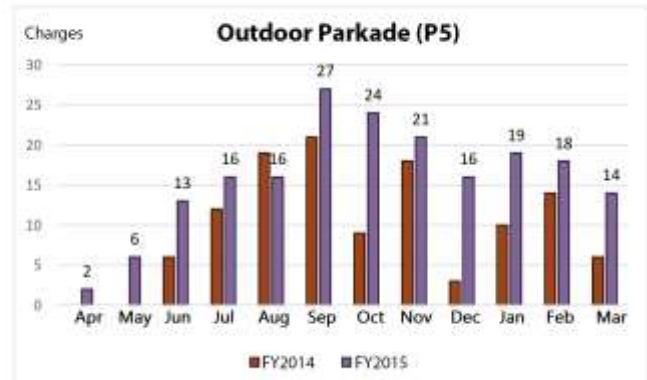
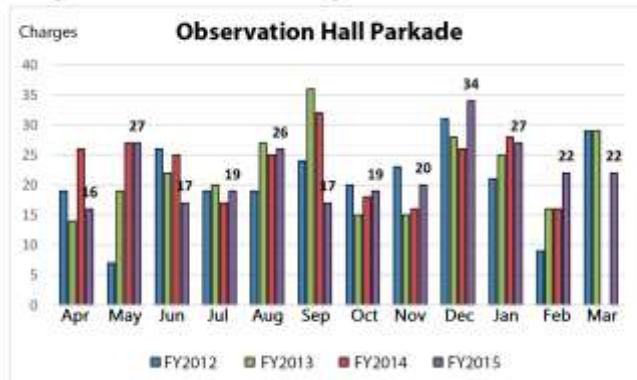
EV rapid charger, at Observation Hall

One rapid charger available 24 hours a day was also installed in Parking Lot 5 (open air) at Terminal 2 in June 2014. In April 2016 we added four regular chargers, bringing the total to eight. Customers can now come to KIX airport facilities being fully confident that they can charge their electric vehicles.



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

### Usage of electrical vehicle chargers



### Kansai International Airport Taxi Operators Council



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 22 hybrid cars, or about 42% of the total fleet of 53 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, and a new megasolar system also started operating in the international freight zone in September 2015.



KIX Megasolar

In March 2016, Nankai buses also started running in that zone with photovoltaic panels on the roof. All of this clean power generation is expected to produce the equivalent of about 9% of the total electricity consumed at Kansai Airport (equal to the consumption of about 2,300 typical households). The system generated about 14.95 million kilowatt-hours (FY2015) to the end of March 2016, reducing CO<sub>2</sub> emissions by about 7,417 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 48,000 kilowatt-hours in fiscal 2015, reducing CO<sub>2</sub> emissions by about 24 tons.

● **Wind power generation**

Since fiscal 2013 KIX Sora Park has had three outdoor street lights powered by wind turbines and solar panels. In fiscal 2015 they generated about 150 kilowatt-hours of electricity, contributing to energy conservation.

Also, a 5-kilowatt small wind turbine that was installed as a symbol of the KIX Smart Island Vision started trial operation in September 2014 as a model case, the first of its kind at an airport in Japan. Two additional turbines of the same size started operating in February 2015. In fiscal 2015 actual production of these units was about 2,760 kilowatt-hours of electricity. The power generated is being used to power streetlights in the Sora Park.



Small wind turbines

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

On May 20, 2014, we fully launched the Hydrogen Grid Project, and in February 2015, we 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 CO<sub>2</sub> emissions than conventional forklifts, and will significantly boost work efficiency, thanks to a refueling time of about three minutes, and no need to recharge or change batteries. Also, in March 2016 two new fuel cell forklifts started use by the ANA and JAL groups, in demonstration trials using the same types of fuel cells as in the hydrogen-powered Mirai car.



Kickoff ceremony for demonstration trials



Hydrogen fuel cell powered forklifts



### (3) An airport that recycles resources

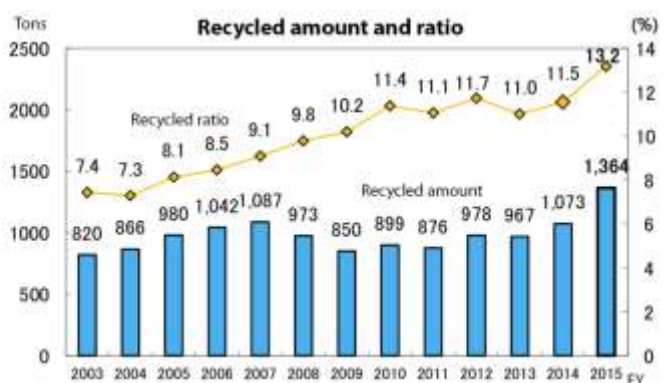
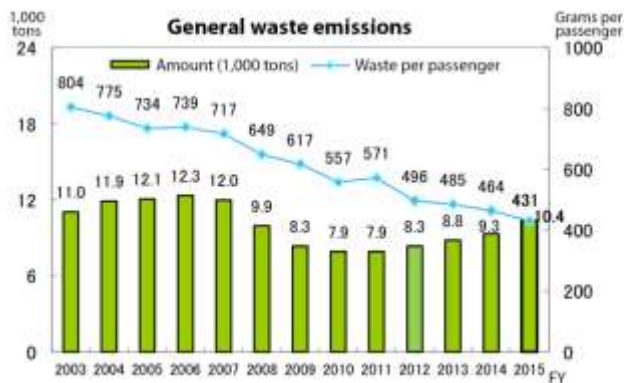
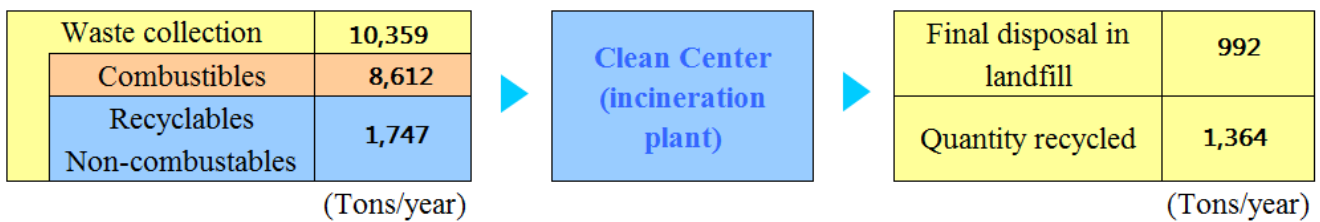
We are working to ensure proper management of waste generated on the airport island, including efforts through recycling and the reduction of waste volume. By using reclaimed water, we are also promoting the efficient use of water resources.

#### ■ 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 10,400 tons of waste generated at the airport in fiscal 2015, but the amount per passenger has declined, and the recycling ratio was 13.2% for general waste (an increase of 1.7% from the previous year).

| 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.

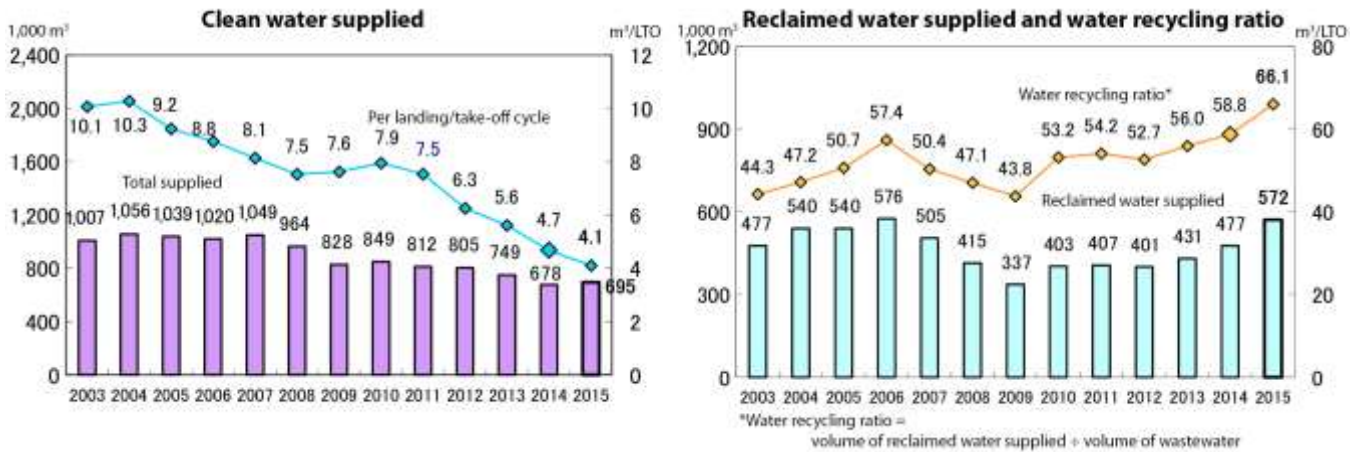


#### ● Efforts of airport island businesses to reduce waste generated

**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 2015, a total of 695,000 cubic meters of water was supplied to the airport (equivalent to 4.1 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 2015, we used 572,000 cubic meters of reclaimed water, and our water recycling rate was 66.1% (7.3% up from the previous year).



### Uses of reclaimed water



Clean water supplied  
695,000 m<sup>3</sup>



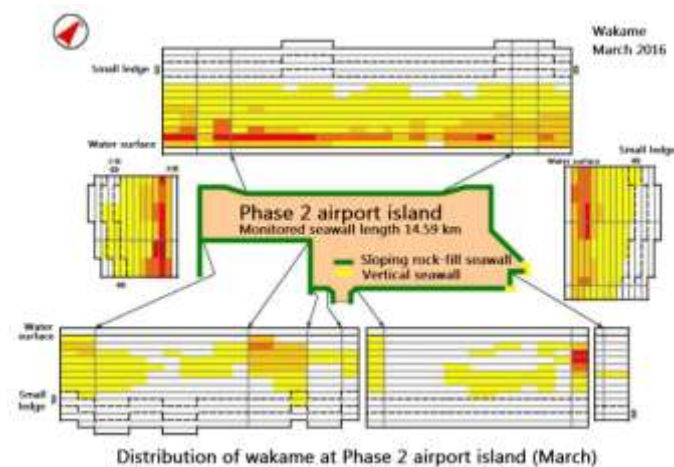
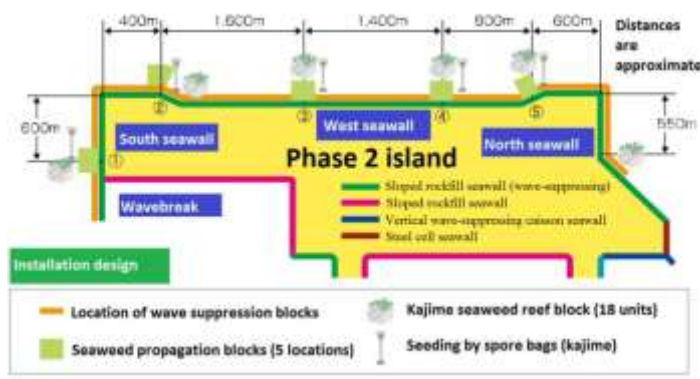


## (4) An airport that respects biodiversity

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).

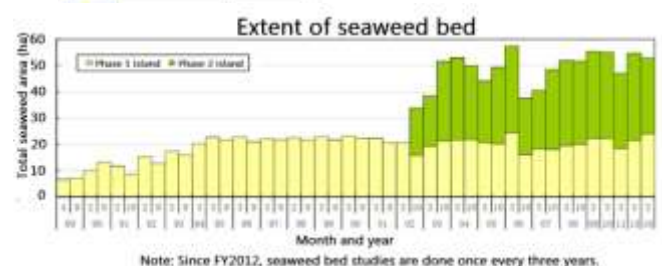


Note: Reference to “seeding by spore bags” refers to an initiative to actively supply spores by placing net bags (spore bags) into the sea containing large mature seaweed blades.

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 2016 found that the total area of seaweed beds around the Phase 1 and Phase 2 airport islands amounted to about 53 hectares, and *wakame* seaweed distribution was as shown in the figure below.

| Rating       | Coverage     | Condition    |
|--------------|--------------|--------------|
| Red          | 81 - 100%    | Very dense   |
| Orange       | 51 - 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 have planted “flower spots” in various places on the airport island with seasonal flowers such as torenia (also known as the wishbone flower), zinnias, and pansies. In November, in the KIX Sora Park along the Terminal 2 road, the Smart Island Council planted snapdragon and stock flower seedlings. In August, a new flower spot was installed and seasonal flowers including torenia and snapdragon planted. This spot is in a section of the international freight zone and also has a hybrid wind turbine. Aiming to preserve landscapes and create spaces of rest and peace on the airport island, we are working to improve and expand the flower spots.



### ● Coastal vegetation: restoration/protection

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



“Hamanadeshiko”



“Hamabossu”



## ■ 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 Garbage” clean-up activities

Outdoor clean-up activities are conducted around Japan on “Zero Garbage Day,” May 30 each year. After our Idling Prevention Campaign we organized a “Zero Garbage” campaign at KIX from May 30 to June 13, involving clean-up activities by KIX Smart Island Council member businesses that have ten or more employees.





## (5) An airport that respects local community

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.



Displays make environmental information more visual



Company website (environmental information)



Company website (CSR reports)

### ■ 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 see how third-party organizations conduct noise analysis.



## ■ Dialogue with local communities

### ● Family Eco Classes

In “Hydrogen and Fuel Cell” classes, elementary school children in the middle and higher years learned environmental topics on the theme of hydrogen and energy. In the first half (presented by Iwatani Corporation), with science kits they experienced a fuel demonstration to understand how easily hydrogen combusts, and then generated hydrogen from water by electrolysis and generated electricity by combining hydrogen and oxygen. The second half (Toyota Corporation) included an explanation of the workings of a fuel-cell-powered car, plus building and testing a model car.



### ● School speakers, environmental education at KIX Sora Farm

We send guest speakers to local elementary schools and also offer airport tours to let older students of elementary schools learn about airplanes and the Kansai International Airport. In fiscal 2015, 991 students from 18 schools participated. In June, we welcomed children from local schools to the KIX Sora Farm, an eco-farm that grows crops with compost made at Osaka International Airport. They enjoyed learning about the environment while harvesting potatoes in June, and peanuts and sweet potatoes in October.



### ● KIX Airport Ekiden & Run

The KIX Airport Ekiden & Run was held on November 28 (Saturday) during the Smart Island Festival. The course went through a green park along inner waters of the Phase 2 island, with a turning point at the KIX Megasolar installation. The 53 teams of six runners (total 318) were supported by KIX and ITM airport businesses.



### ● Eco-Products 2015 exhibit

At the Eco-Products 2015 exhibition held at the Tokyo Big Site over three days starting December 10, we presented an exhibit as an airport booth featuring our environmental initiatives, including the KIX Smart Island Vision and Hydrogen Grid Project, and the use of runway grass clippings at Osaka International Airport.



### ● FY2015 Environment Minister's Award for Global Warming Prevention Activities

On December 2, 2015, Kansai International Airport became the first airport ever to be awarded the Environment Minister's Award for Global Warming Prevention Activities, for the KIX Smart Island Plan, including its innovative initiatives for energy conservation and clean energy.



## ■ Cooperation with businesses at the airport

### ● KIX Smart Island Council initiatives

The KIX Smart Island Council was established as a body for Kansai Airports, operators and businesses at the Kansai International Airport to work together on common objectives, including environmental protection and improvements. With 48 member businesses, the Council has conducted activities such as the vehicle Idling Prevention Campaign, the Garbage Zero 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 efforts to further reduce CO<sub>2</sub> emissions.

At the Good Practices presentations in February 2016, companies made presentations about their innovative efforts: “The ‘Loops’ Paper Reuse System” (Toshiba Tec Corporation), “Environmental Vehicles” (Hino Motors), and “The Use and Safety of Hydrogen Energy” (Research Association of Hydrogen Supply/Utilization Technology).



### ● Environmental Liaison Committee for Major Airports in Japan

To tackle common issues and challenges, in September 2007, 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. The Committee held its fifteenth meeting in April 2015 for the exchange of information on topics such as the status of

usage of ground power units, and methodologies to calculate CO<sub>2</sub> emissions from aircraft.

### ● Trainees from Asia

In March 2016, we welcomed trainees from Asia as part of a course being offered by the Overseas Human Resources and Industry Development Association (HIDA). We introduced them to our environmental initiatives at the Kansai International Airport, and took them on a tour of our wastewater treatment center and other sites.





## 6. Environmental management at airport operator offices

To reduce the environmental impacts of administrative functions at Kansai International Airport, we are working to reduce electrical, water, heat, and other consumption. In fiscal 2015, consumption was down in all categories compared to fiscal 2006, including electricity, heating, cooling, clean water, gasoline, diesel, and office paper. The amount of waste disposed was also reduced. We have been conducting the “Paper Diet Challenge” at the entire airport to significantly reduce paper consumption. As a result, 6.72 million sheets of paper were used in fiscal 2015, a reduction of 2.68 million sheets (29%) compared to consumption before the campaign began (9.40 million sheets in fiscal 2008). We have also been implementing green purchasing based on our “Green Purchasing Guidelines,” adopted in February 2010.

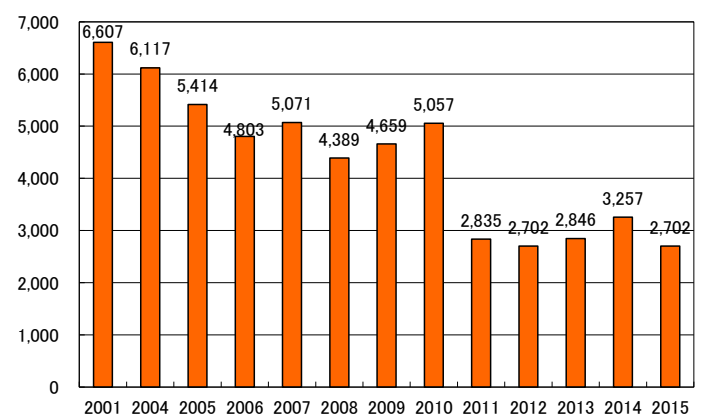
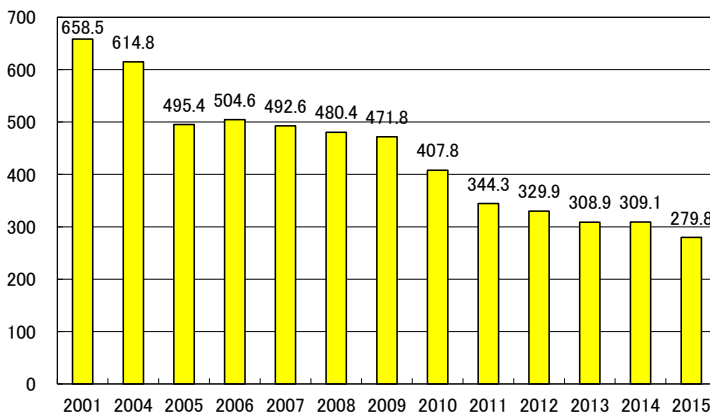
Note: All figures compared to FY2006.

### (1) Electricity consumption

2.25 million kWh reduction (44.6%)

### (2) Heating

2,101 GJ reduction (43.7%)

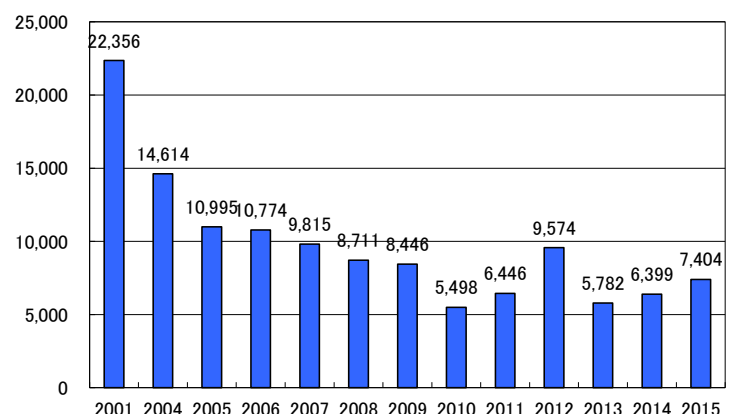
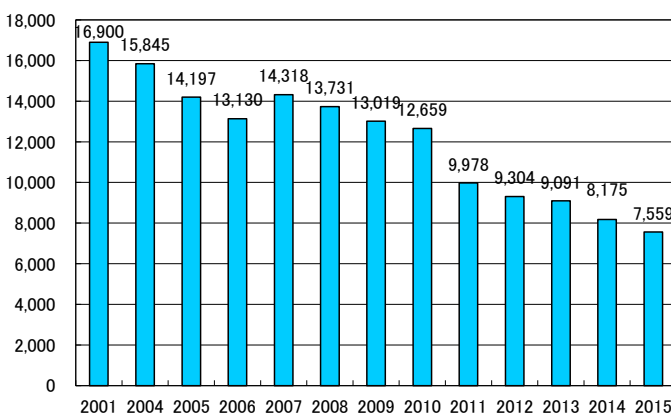


### (3) Cooling

5,571 GJ reduction (42.4%)

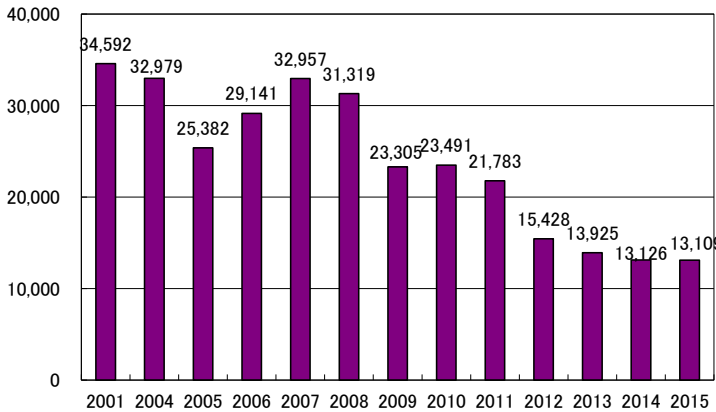
### (4) Clean water

3,370 m<sup>3</sup> reduction (31.3%)



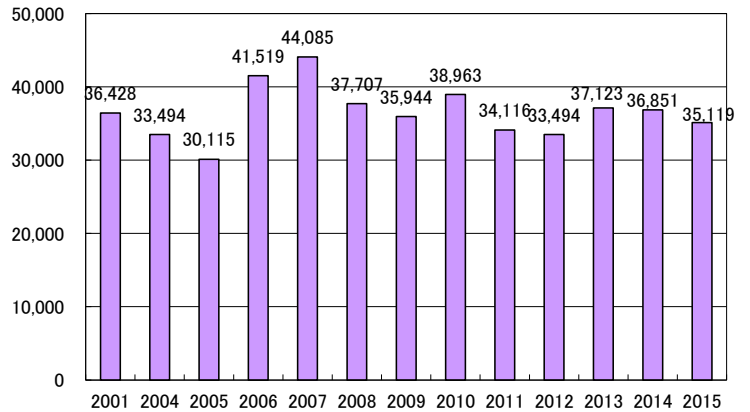
**(5) Gasoline**

16,032 L reduction  
(55.0%)



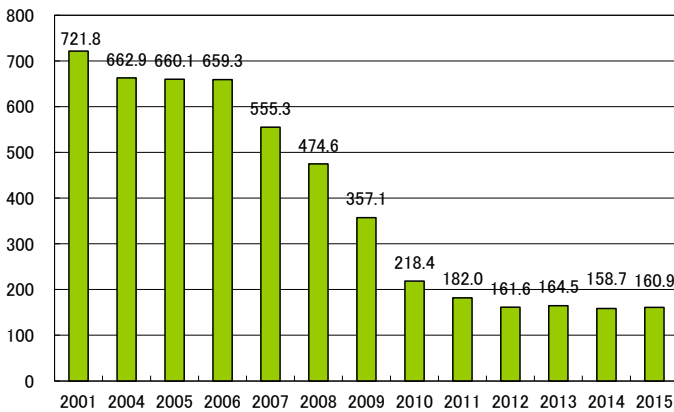
**(6) Diesel**

6,440 L reduction  
(15.4%)



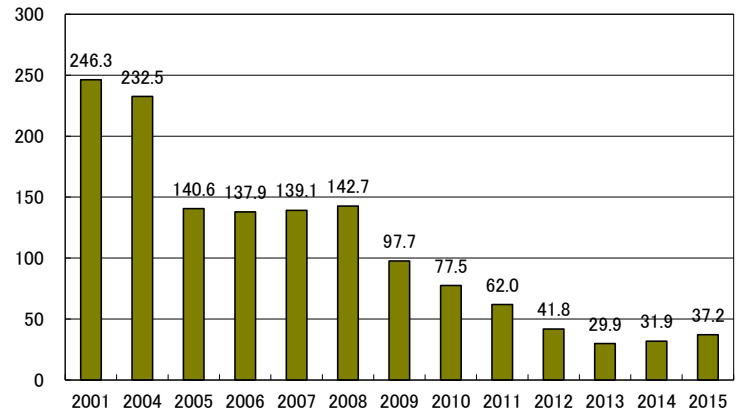
**(7) Office paper**

4.98 million sheet  
reduction (75.6%)



**(8) Waste**

101 ton reduction  
(73.0%)



**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

**The “Loops” Paper Reuse System, by Toshiba Tec Corporation**

We started trial use of Loops printers, as we have already implemented a variety of initiatives that have now become generally accepted, including limiting the number of copies printed, aggregate printing (multiple pages per sheet of paper), and going paperless by using information technology more. The Loops system permits repeated printing on paper thanks to the use of erasable toner, and is expected to also reduce CO<sub>2</sub> emissions by reducing the amount of copy paper used compared to conventional printers.



## 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: Airport operator
- ◆ Accounting period: April 1, 2015, to March 31, 2016
- ◆ Environmental cost categories: Based on “Environmental Accounting Guidelines 2005” (Ministry of the Environment), considering specific conditions of the airport operator.
- ◆ 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

The total environmental protection costs in fiscal 2015 amounted to 4.37 billion yen, up 332 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 820 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 8.8 billion yen has been spent on environmental monitoring and studies between the year the airport opened and fiscal 2015, 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                         | 2,048              | (2,058) |
|                           | Energy/water conservation                    | 321                | (447)   |
|                           | Treatment/disposal of general waste          | 1,864              | (1,405) |
|                           | Subtotal                                     | 4,233              | (3,910) |
| Administrative costs      | Social contributions relating to environment | 20                 | (12)    |
|                           | Environmental studies                        | 116                | (116)   |
|                           | Subtotal                                     | 136                | (128)   |
| Total environmental costs |  | 4,370              | (4,038) |

Figures in parentheses are for FY2014.

Note: Totals may not match due to rounding.

#### Environmental benefits

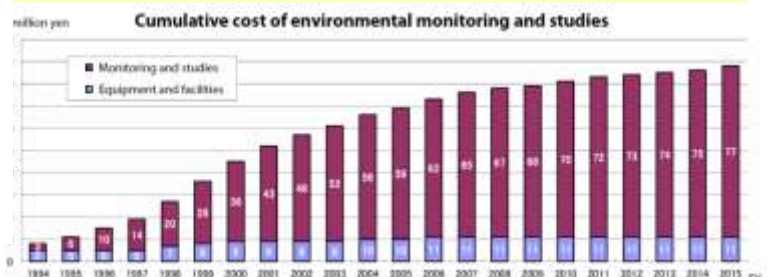
|                    | Env. impact reduced | Monetary equiv. |
|--------------------|---------------------|-----------------|
| Wastewater plant   | T-N: 77.32 tons     | 6 million yen   |
|                    | (T-N: 77.13 tons)   | (6 million yen) |
| Incineration plant | NOx: 34.27 tons     | 6 million yen   |
|                    | (NOx: 34.60 tons)   | (6 million yen) |

Figures in parentheses are for FY2014.

#### Savings (benefits) from environmental measures

(all below in million yen)

|   |     |
|---|-----|
| 1 Reduced municipal water use, due to reclaimed water use:          | 241 |
| 2 Reduced public sewage treatment fees due to treatment at KIX:     | 270 |
| 3 Reduced incineration costs off island due to incineration at KIX: | 287 |
| 4 Reduced economic cost due to energy saving:                       | 22  |
| Total:  | 820 |





## (2) Environmental performance data

| Item  | Units                       | FY2004  |         |         |         |         |         |         |         |         |         |         |         | Compared to base year (FY2011) | Scope of data used |   |
|---|-----------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------------------------------|--------------------|---|
|   |                             | FY2004  | FY2005  | FY2006  | FY2007  | FY2008  | FY2009  | FY2010  | FY2011  | FY2012  | FY2013  | FY2014  | FY2015  |                                |                    |   |
| <b>Primary energy managed by KIAC</b>                       |                             |         |         |         |         |         |         |         |         |         |         |         |         |                                |                    |   |
| Electricity consumption                                     | (MWh)                       | 116,404 | 115,577 | 113,079 | 114,743 | 110,000 | 106,740 | 104,717 | 102,270 | 102,872 | 104,801 | 104,098 | 102,774 | 504 MWh                        | (0.5%) Up          |   |
| Energy consumption for cooling                              | (GJ)                        | 289,243 | 274,901 | 261,073 | 267,063 | 270,467 | 246,420 | 257,685 | 249,918 | 246,304 | 246,745 | 228,966 | 237,318 | 12,600 GJ                      | (5.0%) Down        |   |
| Energy consumption for heating                              | (GJ)                        | 145,967 | 157,774 | 144,850 | 151,919 | 140,386 | 142,484 | 151,056 | 161,025 | 162,491 | 157,141 | 155,856 | 143,704 | 17,321 GJ                      | (10.8%) Down       |   |
| Natural gas consumption                                     | (m <sup>3</sup> )           | 139,110 | 151,495 | 147,364 | 142,277 | 131,792 | 127,824 | 125,902 | 111,204 | 108,591 | 120,932 | 277,213 | 256,793 | 145,589 m <sup>3</sup>         | (130.9%) Up        |   |
| Crude oil equivalent  | (kl)                        | 45,374  | 45,087  | 43,501  | 44,381  | 42,877  | 41,250  | 41,424  | 40,855  | 40,931  | 40,503  | 39,823  | 39,340  | 1,515 kl                       | (3.7%) Down        |   |
| <b>Total greenhouse gas emissions from KIX</b>              |                             |         |         |         |         |         |         |         |         |         |         |         |         |                                |                    |   |
| Carbon dioxide (CO <sub>2</sub> )                           | (10,000 t-CO <sub>2</sub> ) | —       | —       | 54.4    | 57.1    | 52.6    | 41.1    | 41.2    | 42.7    | 45.2    | 46.4    | 48.5    | 52.6    | 9.9 t-CO <sub>2</sub>          | (23.2%) 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) |
| (per aircraft landing/takeoff)                              | (t-CO <sub>2</sub> )        | —       | —       | 4.65    | 4.40    | 4.07    | 3.79    | 3.86    | 3.96    | 3.51    | 3.48    | 3.35    | 3.11    | 0.85 t-CO <sub>2</sub>         | (21.5%) Down       |   |
| Methane   | (t-CO <sub>2</sub> )        | —       | —       | 361     | 406     | 424     | 357     | 351     | 354     | 420     | 435     | 472     | 655     | 301 t-CO <sub>2</sub>          | (85.0%) Up         | * Emissions from vehicles are from vehicles operating within the restricted areas, and exclude through-traffic of taxis, ships, and vehicles.   |
| N <sub>2</sub> O  | (t-CO <sub>2</sub> )        | —       | —       | 2,840   | 2,963   | 2,892   | 2,540   | 2,431   | 2,431   | 2,800   | 2,921   | 3,137   | 3,451   | 1,020 t-CO <sub>2</sub>        | (42.0%) Up         |   |
| Total   | (10,000 t-CO <sub>2</sub> ) | —       | —       | 54.8    | 57.4    | 52.9    | 41.4    | 41.5    | 43.0    | 45.5    | 46.7    | 48.9    | 53.0    | 10 t-CO <sub>2</sub>           | (23.3%) Up         |   |
| (per aircraft landing/takeoff)                              | (t-CO <sub>2</sub> )        | —       | —       | 4.68    | 4.42    | 4.09    | 3.81    | 3.88    | 3.99    | 3.54    | 3.50    | 3.37    | 3.13    | 0.86 t-CO <sub>2</sub>         | (21.6%) Down       |   |
| <b>Concentrations, measures for air and water pollution</b> |                             |         |         |         |         |         |         |         |         |         |         |         |         |                                |                    |   |
| Dioxins   | (ng-TEQ/Nm <sup>3</sup> )   | 0.090   | 0.048   | 0.20    | 0.00061 | 0.070   | 0.00097 | 0.19    | 0.04    | 0.00685 | 0.00905 | 0.00801 | 0.00307 | —                              | —                  | Concentrations in incineration plant emissions  |
| Nitrogen oxides (Nox)                                       | (ppm)                       | 32      | 28      | 39      | 33      | 34      | 46      | 37      | 45      | 32      | 42      | 30      | 34      | —                              | —                  |   |
| Soot and dust   | (g/Nm <sup>3</sup> )        | 0.002   | *       | *       | *       | *       | *       | *       | *       | *       | *       | *       | *       | —                              | —                  |   |
| COD   | (mg/L)                      | 9.4     | 9.6     | 8.1     | 10.8    | 9.6     | 9.2     | 12.5    | 8.6     | 9.2     | 10.3    | 9.0     | 8.9     | —                              | —                  | Water quality of discharge from wastewater treatment plant  |
| T-N   | (mg/L)                      | 1.4     | 2.3     | 1.9     | 3.5     | 1.7     | 2.4     | 3.9     | 3.7     | 5.1     | 6.0     | 5.6     | 5.8     | —                              | —                  |   |
| T-P   | (mg/L)                      | 0.12    | 0.084   | 0.084   | 0.19    | 0.15    | 0.1     | 0.1     | 0.1     | 0.1     | 0.1     | 0.1     | 0.1     | —                              | —                  |   |
| <b>Waste disposal</b>                                       |                             |         |         |         |         |         |         |         |         |         |         |         |         |                                |                    |   |
| Total disposal – general waste                              | (t)                         | 11,891  | 12,058  | 12,327  | 11,962  | 9,945   | 8,337   | 7,902   | 7,919   | 8,579   | 9,073   | 9,294   | 10,359  | 2,441 t                        | (30.8%) Up         | Volume handled by incineration plant  |
| Total landfilled – general waste                            | (t)                         | 1,561   | 1,557   | 1,580   | 1,480   | 1,264   | 1,091   | 1,092   | 1,019   | 994     | 910     | 965     | 992     | 27 t                           | (2.6%) Down        |   |
| Quantity recycled   | (t)                         | 866     | 980     | 1,042   | 1,087   | 973     | 850     | 899     | 876     | 978     | 969     | 1,073   | 1,364   | 488 t                          | (55.7%) Up         |   |
| <b>Water resources</b>                                      |                             |         |         |         |         |         |         |         |         |         |         |         |         |                                |                    |   |
| Clean water supplied  | (1,000 m <sup>3</sup> )     | 1,056   | 1,039   | 1,020   | 1,049   | 964     | 828     | 849     | 812     | 805     | 749     | 678     | 695     | 117 1,000 m <sup>3</sup>       | (14.4%) Down       | Amount supplied to airport island   |
| Reclaimed water   | (1,000 m <sup>3</sup> )     | 540     | 540     | 576     | 505     | 415     | 337     | 403     | 407     | 401     | 431     | 477     | 572     | 165 1,000 m <sup>3</sup>       | (40.5%) Up         |   |
| Wastewater treated  | (1,000 m <sup>3</sup> )     | 1,150   | 1,066   | 1,003   | 1,002   | 882     | 769     | 758     | 750     | 761     | 769     | 811     | 865     | 115 1,000 m <sup>3</sup>       | (15.3%) Up         | Volume handled by wastewater treatment plant  |
| Wastewater discharged                                       | (1,000 m <sup>3</sup> )     | 563     | 475     | 389     | 438     | 392     | 365     | 315     | 315     | 329     | 322     | 311     | 264     | 51 1,000 m <sup>3</sup>        | (16.2%) Down       |   |
| <b>Reference values for airport activity volume</b>         |                             |         |         |         |         |         |         |         |         |         |         |         |         |                                |                    |   |
| No. aircraft landings-takeoffs                              | (10,000 LTOs)               | 10.3    | 11.3    | 11.7    | 13.0    | 12.9    | 10.9    | 10.7    | 10.8    | 12.9    | 13.3    | 14.5    | 16.9    | —                              | —                  | Overall measures of KIX operations  |
| Air passenger traffic                                       | (10,000 persons)            | 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 | 2,405.7 | —                              | —                  |   |
| Cargo volume  | (10,000 tons)               | 85.6    | 84.3    | 80.2    | 84.7    | 72.6    | 63.4    | 75.0    | 71.2    | 68.7    | 67.1    | 74.1    | 70.0    | —                              | —                  |   |

\* Indicates below minimum measurement threshold

## 8. Chronology of environmental initiatives

| 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                              |
|      | 11  | International Airport Symposium 2001 hosted, Phase 2 airport island seawall completed   |
| 2002 | 10  | KIAC adopts Regulations Governing the Use of Waste Processing Facilities  |
|      | 12  | KIAC establishes Energy Conservation Committee  |
|      | 12  | KIAC releases first Eco-Island Report (2002 edition)  |
| 2003 | 12  | KIAC establishes KIX Customer Satisfaction Council  |
| 2004 | 9   | International Airport Symposium 2004 hosted   |
|      | 12  | KIAC, KALD mount their first exhibit 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  |
| 2009 | 7   | Full-scale use of truck-mounted ground power units (GPUs) begins  |
|      | 11  | KIX Science Classes held  |
| 2010 | 1   | Partial changes to aircraft auxiliary power unit (APU) usage restrictions (use reduced from 30 to 15 min. before departure)   |
|      | 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                                   |
|      | 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   | Exhibit at Eco-Products 2012 exhibition. Four regular chargers for electric vehicles installed in parkade.                       |
|      | 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  | Exhibit at Eco-Products 2013 exhibition. Winter Vacation Family Eco Classes held.  |
|      | 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  |
|      | 7   | Small wind turbine power generator installed—a first for any Japanese airport  |
| 2015 | 2   | Trial operations launched for first fuel cell-powered forklift at any airport in Asia, plus demonstration trial of hydrogen grid |
|      | 8   | "Hydrogen and Fuel Cell" Family Eco Classes held   |
|      | 9   | Megasolar system starts operating on roof of air freight warehouse in international freight zone                                 |
|      | 10  | Exhibit at Biwako Environmental Business Exhibition 2015   |
|      | 12  | Awarded the FY2015 Environment Minister's Award for Global Warming Prevention Activities   |
|      | 12  | Exhibit at Eco-Products 2015 exhibition  |
| 2016 | 1   | Largest hydrogen station at an airport in Asia opens   |
|      | 3   | Awarded 2015 Kansai Eco Office Grand Prize from Union of Kansai Governments  |
|      | 3   | Two new model fuel cell forklifts added for demonstration trials   |
|      | 4   | Four more regular chargers installed for electric vehicles in parkade  |

□ 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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Published September 2016