



Kansai International Airport / Osaka International Airport / Kobe Airport

# Environmental Report 2018

# **Committed to Operating Eco Friendly, Smart Airports**



Shaping a New Journey

#### Kansai Airports Environmental Statement

Kansai Airports group is engaged in various activities to reduce the impact on the environment at 3 airports (Kansai International Airport, Osaka International Airport, Osaka International Airport and Kobe Airport). In order to further promote our activities, we have created a new environmental plan, set specific targets and measures have been established based on the following 4 pillars as indices for future initiatives toward reduction of environmental impact.

• Response to climate change

We promote efficient energy usage to reduce environmental burdens and engage in measures aimed at reducing greenhouse gas emissions. We also encourage the use of solar, hydrogen and other types of sustainable energy and new energy that contributes to protecting the global environment.

#### Resource usage

In addition to minimizing waste, we separate, recycle and reuse all the waste generated. We also contribute to resource conservation through the promotion of "Reduce, Reuse and Recycle (the 3Rs)" with respect to both waste and water, including efforts to make water use more efficient through data analysis, expand the adoption of recycled water and examine rainwater usage.

#### • Environmental Harmony

We continue to work on reducing aircraft noise, conduct environmental monitoring appropriately and disclose monitoring results. We will also promote the creation of positive spaces where airport users can relax and feel comfortable while striving to preserve biodiversity through the maintenance and expansion of greenbelts and conducting environmental surveys to verify species.

#### • Environmental management

Using environmental evaluation programs, we have created a mechanism to enable the understanding and assessment of environmental burdens that lead to their reduction. We also make an effort to engage in dialogues with customers, airport staff and local communities through the dissemination of environmental information and the provision of environmental education, as well as alliances with airport-related businesses and airports throughout Japan and overseas.

Kansai Airports group is fully aware of its responsibility toward the global and regional environmental changes. We will continue to promote initiatives aimed to reduce our environmental impact and to develop the airport while coexisting with the surrounding environment.

#### Our environmental targets: (target year: FY 2022, base year: FY 2016)

- 1. Reduce our energy use per unit of traffic by 1% per year on average.
- 2. At each airport, reduce our CO2 emissions per unit of traffic by 1% per year on average.
- 3. At each airport, reduce the use of city water per passenger by 2% per year on average.
- 4. Increase the rate of recycling to 35%.
- 5. Enter each airport in environmental certification programmes such as Airport Carbon Accreditation and IISO14001.
- 6. Perform biodiversity assessments and protect biodiversity on and around our airports.
- 7. Actively support the development of hydrogen as a clean energy source.

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Yoshiyuki YAMAYA Chief Executive Officer Kansai Airports

Emmanuel MENANTEAU Co-Chief Executive Officer Kansai Airports



### **Company Profile**

Name	Kansai Airports
Date of incorporation	December 1, 2015
Location	1-banchi, Senshu-Kuko Kita, Izumisano-shi, Osaka 549-8501, Japan
Company representatives	Yoshiyuki Yamaya Chief Executive Officer Emmanuel Menanteau Co-Chief Executive Officer
Business scope	<ul> <li>Operation and management services, etc. of Kansai International Airport and Osaka International Airport</li> <li>Operation of Kobe Airport by Kansai Airports Kobe</li> </ul>
Capital	25 billion yen
Shareholders	ORIX Corporation 40%, VINCI Airports 40%, Other investors 20%



### Contents



### **Editorial Policy**

#### Purpose of this report

This report is published to convey to stakeholders in an easy-to-understand manner initiatives, including data, for reducing environmental impacts being carried out by Kansai International Airport and Osaka International Airport, which are managed by Kansai Airports.

#### **Reporting boundary**

This report focuses on the activities of Kansai Airports and also covers the activities of certain Group companies and businesses operating at the airports its manages.

#### **Reporting period**

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Activities carried out during fiscal 2017 (April 2017 to March 2018). Certain activities in this report may have taken place before or will take place after this period.



















# **One Eco-Airport Plan**

We established the One Eco-Airport Plan, an environmental plan covering the three airports of Kansai International Airport, Osaka International Airport, and Kobe Airport. This plan, which got underway in fiscal 2018, spans the five-year period up to fiscal 2022, using four policies to promote activities across all three major airports in the Kansai region aimed at reducing our environmental impacts.



Environmental Promotion System

Working in conjunction with airport-related businesses

Kansai Airports established the Environmental Promotion Committee to promote plans, analyze and assess the status of target achievement and improve initiatives. The Energy Conservation Committee promotes specific actions aimed at conserving energy and reducing greenhouse gas emissions. Further, each of the three airports has its own Airport Environmental Promotion Council through which they promote cooperation, collaboration and initiatives with airport-related businesses.







#### **Strategic Goals**

#### Amount of clean water used



#### Waste recycle rate





# Harmonious Coexistence - See p.21

We will continue to work on reducing aircraft noise, conduct environmental monitoring appropriately and disclose monitoring results. We will also promote the creation of positive spaces where airport users can relax and feel comfortable while striving to preserve biodiversity through the maintenance and expansion of greenbelts and environmental surveys to verify species.



# **Environmental Management** Greep.29

Using environmental assessment programs, we will create a mechanism for understanding, assessing and mitigating environmental impacts. We also make efforts to engage in dialogue with customers, airport staff and local communities through the dissemination of environmental information and the provision of environmental education, as well as alliances with airport-related businesses and airports throughout Japan and overseas.



# **Response to Climate Change**

To combat climate change, Kansai Airports promotes energy efficiency and works to lower its GHG emissions by introducing renewable energy and eco-friendly vehicles.

# Promote Energy Conservation

#### Operations that are More Energy Efficient and Conserve Energy

Kansai Airports Group has established a carbon management plan to rein in CO<sub>2</sub> emissions. This plan outlines our future actions for reducing our carbon footprint including energy conservation promotion system, reduction targets and medium- to long-term plans.

Our energy conservation measures involve increasing the efficiency of equipment and plants along with upgrading building insulation and other facility-focused solutions. Also, we are promoting the optimization of operations and initiatives based on visualization and analysis of the energy we use.

#### KIX

Kansai International Airport (KIX) is systematically increasing the efficiency of its current facilities and promoting the optimization of operations of new facilities.

In fiscal 2017, the airport took a number of steps to increase efficiency, including switching to LED lighting at its cargo terminal, upgrading the aeration system used by its Sewage Treatment Center, and introducing higher efficiency motors for baggage

#### Energy use of the Kansai Airports Group



Note: The heat conversion of electricity and gas uses the conversion factor based on the Act on the Rational Use of Energy Total energy: Energy use

Energy/TU: Energy use per traffic unit

Traffic unit (TU): Passengers (persons) + Cargo (per 100kg)

Terajoules (TJ): 1 TJ =  $10^{12}$  J Megajoules (MJ): 1 MJ =  $10^{6}$  J conveyors. In addition, the airport is making efforts to improve operations at the new Terminal 2 building for international flights in order to optimize air conditioning, ventilation and lighting intensity based on the area and situation. These countermeasures have helped the airport reduce its CO<sub>2</sub> emissions by around 350 tons annually.

Looking ahead, the airport will work on sharing information internally using its energy dashboard linked to the BEMS in order to promote even greater energy savings. It will also analyze detailed data on air conditioning and heating delivery systems. \* BEMS stands for Building Energy Management System



Newly installed LED lighting at KIX's cargo terminal



Energy dashboard linked to the BEMS

#### ITAMI

Osaka International Airport (ITAMI) is undergoing a major renovation of its terminal building to improve passenger convenience and reinforce the building itself. During the renovation, the airport is taking various steps to conserve energy, including upgrading the building's insulation, blocking intense sunlight, incorporating natural light, and switching to LED lighting.

As part of measures to upgrade the building's insulation and block intense sunlight, the airport will insulate windows using low-emissivity glass and install light-blocking panels designed to fit with the new terminal's design theme. As a result of these countermeasures, the airport has reduced CO<sub>2</sub> emissions by around 74 tons annually.



Rooftop greenery



Light-blocking panels







Low-emissivity glass

LED lighting

Natural lighting

**Response to Climate Change** 

### co2 Reducing GHG Emissions

#### Reducing CO<sub>2</sub> from Our Airports

#### KIX ITAMI

In fiscal 2017, CO<sub>2</sub> emissions from operations totaled 630 thousand tons at KIX and 242 thousand tons at ITAMI, marking an increase of 3.5% and a decrease of 0.7%, respectively, from the previous year. Total CO2 emissions from aircraft increased, but CO2 emissions per traffic unit dropped due to an increase in the number of aircraft landings and takeoffs along with an increase in the percentage of small aircraft. Meanwhile, CO<sub>2</sub> emissions per traffic unit decreased for airport facilities managed by Kansai Airports, and for airport facilities managed by other businesses. This was due in part to efforts to reduce emissions, including energy conservation. The largest share of CO2 emissions was from aircraft, followed by accessing the airports, passenger terminals, and other airport facilities.

Going forward, we will make efforts to lower energy use and improve overall energy efficiency at our airports.



#### CO2 Emissions of Kansai Airports Group

CO2 emission OCO2/TU

Note: CO2 emissions: amount of CO2 emitted

CO2/TU: CO2 emission per traffic unit

Traffic Unit (TU): Passenger (persons) + cargo volume (per 100 kg)

#### CO<sub>2</sub> Emissions from the Airport



Note:Calculation Conditions

Airport vehicles refer to passenger vehicles and GSE vehicles.
Waste materials are based on carbon neutrality.
Emissions from accessing the airport, etc. and aircraft are based on estimates.

 Emissions from aircraft are based on the LTO (Landings and Takeoffs: aircraft activity at altitude of 3,000ft and under) cycle stipulated by ICAO.

#### Promoting the Use of GPU

#### KIX ITAMI

CO2 emissions can be controlled by increasing the use of GPU (Ground Power Units) instead of an aircraft's APU (Auxiliary Power Units) to supply electricity to parked aircraft. Kansai Airports has requested that all airlines using its airports use GPU.

In terms of GPU use, partial changes were made to the AIP effective January 2010. This included shortening the time allowed for APU use at KIX from 30 minutes to 15 minutes prior to scheduled departure, making KIX the first airport in Japan to do so.

At ITAMI, the AIP defines the time allowed for APU use as 30 minutes prior to scheduled departure, effective March 29, 2018.

#### Outline of GPU



#### KIX

The rate of use of GPU (including mobile types) in fiscal 2017 was 80.2% across all our airports.



#### ITAMI

The number of hours GPUs were used in fiscal 2017 increased 3% compared to fiscal 2016.

#### Working to Eliminate Vehicle Idling

#### Calling for Understanding and Cooperation in Stopping Vehicle Idling

The Airport Environmental Promotion Councils of KIX and ITAMI are implementing a stop idling campaign at the airports during the month of June, which is designated as Environmental Month by Japan's Ministry of the Environment. As part of the campaign, the airports raise awareness among airport users and businesses about the importance of environmental conservation and make efforts to encourage their active participation in environmental conservation activities. This year the airports handed out an educational leaflet and paper fan to drivers of trucks, limousine buses, taxis, and passenger vehicles that use the airports to call for their understanding and cooperation in stopping vehicle idling (held on June 6, 2017). The airports saw a much larger turnout than last year as 150 airport stakeholders helped to raise awareness and promote active participation in environmental conservation at both airports.

Every year, after this campaign ends the airports hold a zero-garbage campaign to pick up trash around pick-up and drop-off zones and parking lots. Another zero-garbage campaign is held on May 30 with the cooperation of businesses at the airports to pick up trash around their offices.



#### Promoting the Use of Eco-Friendly Vehicles

Our airports are helping to reduce CO<sub>2</sub> emissions by introducing eco-friendly vehicles to their large fleet for servicing aircraft operations, including Ground Support Equipment (GSE) vehicles and passenger vehicles. At the Kansai Airports Group, we are promoting the introduction of eco-friendly vehicles in our fleet and calling on businesses operating at our airports to do the same.

The percentage of eco-friendly vehicles\* in the fleet of Kansai Airports Group stood at 25% for KIX and 27% for ITAMI as of March 2018.

- \* EV, FCV, CNG, HV, PHV, CDV, and low emissions vehicles (see note) Note: Low emissions vehicle refers to vehicles that satisfy the following
  - emissions and fuel economy standards.
  - 1) Gasoline vehicles Emissions: 75% less than 2005 standards
  - Fuel economy: At least 2015 standards or 25% above 2010 standards
  - 2) Diesel vehicles
  - Emissions: Post new long-term regulation Fuel economy: At least 2015 standards

#### **Our Initiatives**



#### **Response to Climate Change**

#### Installation of EV Charging Stations

Each of our airports has a full complement of electric vehicle charging stations to encourage the use of eco-friendly vehicles.





EV charging station

#### Expanding the Use of Clean Energy

We are encouraging the use of renewable energy and new forms of energy to lower our GHG emissions.

#### KIX

#### Solar Power

In February 2014, KIX Mega Solar commenced operations using solar panels installed at a site on the south side of the 2nd phase airport island and the rooftop of the airport's cargo terminal. In September 2015, the airport began operating a solar power system installed on the rooftop of the International Cargo Area at the 1st phase airport island.

In March 2016, another solar power system commenced operations on the roof of the Nankai Bus Terminal in the Domestic Cargo Area. This demonstrates that the airport is working hard to promote the spread of solar power onsite.

This clean energy generated at the airport has helped it reduce total electricity use by around 10%.



Solar panels on the roof of Nankai Bus Terminal



KIX Mega Solar

#### KIX Small Wind Turbines

Since fiscal 2013, the airport has installed small wind turbines to power the lights at KIX Sky Park along with three street lights powered by solar panels.

The airport began operating a 5kw small wind turbine as part of a trial in September 2014 becoming the first airport in Japan to do so. Currently, the airport has three of these turbines.

The electricity generated by these small wind turbines is used to power the street lights inside KIX Sky Park.

#### • September 2014

Commences trial run of one 5kw small wind turbine, becoming the first airport in Japan to do so

#### •February 2015

Installs two additional small wind turbines; now operates a total of three



Small wind turbines

#### KIX

#### Hydrogen Energy

The airport marked the full-scale launch of the Hydrogen Grid Project in May 2014. Through this project, the airport is promoting the use of hydrogen energy, which is considered the ultimate form of clean energy because it emits only water when burned. Hydrogen is garnering a great deal of attention as a way to combat global warming.

#### **Fuel Cell Vehicles**

In January 2016, a large hydrogen station opened on the 2nd phase airport island. This was the first and largest commercial hydrogen stations to open at an airport in Japan. The station is able to service fuel cell vehicles (FCV) and in the future it will be able to accommodate fuel cell buses expected to be operated on limousine bus routes from ITAMI and as shuttle buses operating within KIX.

• May 2007

Opens hydrogen station and introduces vehicles with a hydrogen engine into its fleet

#### October 2012 to March 2014

Conducts real life testing using a hydrogen fuel cell bus as a shuttle bus from the Aeroplaza to Terminal 2

• April 2015

Introduces the Toyota Mirai, the world's first mass produced hydrogen fuel cell vehicle, into its vehicle fleet

• January 2016

Iwatani Hydrogen Station KIX begins operations

December 2016

Introduces the Honda Clarity Fuel Cell

#### **Fuel Cell Forklifts**

In April 2017, the airport completed work on Japan's first hydrogen infrastructure for industrial vehicles at the International Cargo Area that includes liquid hydrogen tanks and high pressure hydrogen supply lines. The largest trial operation in Japan using hydrogen infrastructure and fuel cell forklifts is now taking place. Introducing fuel cell forklifts to handle air cargo 24 hours a day can help to lower CO<sub>2</sub> emissions compared to forklifts powered by fossil fuel or electricity. In addition, fuel cell forklifts can be refueled in around three minutes, meaning they can be operated continuously without the hassle of charging or replacing battery packs. As a result, they can offer significant improvements in both work efficiency and work environment.

#### • February 2015

Begins trial operation of fuel cell forklifts at the International Cargo Area as part of the *Fuel Cell Forklift Practical Application and Development/Testing of Optimal Hydrogen Infrastructure Improvements Project*, selected by the Ministry of the Environment, becoming the first airport in Asia to do so

#### November 2016

Introduces first mass produced fuel cell forklift

#### • April 2017

Commences operations of hydrogen station for industrial vehicles







Opening ceremony of hydrogen station for industrial vehicles



Fuel cell forklift

#### KIX Hydrogen Grid(Concept)

Large hydrogen station (2nd phase airport island) Fuel cell vehicles



# **Resource Usage**

In addition to minimizing waste, we separate, recycle and reuse all waste generated. We are also actively working to reduce drinking water usage by increasing the use of recycled water and rainwater as well as implementing water conservation measures.

## Reduction of Clean Water Consumption

#### Utilize rainwater/reclaimed water

#### KIX

KIX effectively utilizes water resources by reusing water treated at the Sewage Treatment Center on the airport island as reclaimed water. Reclaimed water is used in public restrooms and to water plants. It is also used to clean road, taxiway and runway surfaces. In fiscal 2017, KIX used 522,000 m<sup>3</sup> of reclaimed water and achieved a recycling rate of 59.0%.



Water for toilets





Cleaning a taxiway surface



Watering plants

Water Recycling Rate and Reclaimed Water Usage

#### KIX

Water recycling rate

59.0%



Reclaimed water usage Water recycling rate Note:Water recycling rate: Reclaimed water usage / Water discharge

# Trinking water 761,000 m<sup>3</sup>



Drinking water Orinking water usage per PAX

Drinking water

# 314,000 m<sup>3</sup>

(Thousan 120 –	ds of m³)		(L/PAX – 45
100 -	22.0		
80 -	0	20.0	- 30
60 -		•	
40 -	_		- 15
20 -	34.2	3 <mark>1.4</mark>	
0 —	2016	2017	0
	2010	2017	(11)

#### ITAMI

Some businesses at ITAMI are reducing clean water consumption by collecting rainwater and using it, for example to water plants, to ensure water resources are used more effectively.



#### KOBE

KOBE utilizes resources effectively by using filtered rainwater and water that has been processed at a sewage treatment plant in restrooms and to water plants.



#### **Rainwater utilization**

Kansai Airports is carrying out a number of initiatives to conserve water, including installing low-flow toilets when remodeling terminal buildings.

#### KIX

The Nankai Bus Co., Ltd. has installed water-saving bus washing equipment at its facilities on the airport island. Also, the company has installed wastewater filtering and recirculation system to re-use wastewater, which is reducing the consumption of clean water.



#### ITAMI

Businesses at ITAMI airport are promoting water conservation through various means, including the use of automatic faucets in sinks for handwashing, and noise generators in women's toilets that reduce the need to flush. Additional approaches include adjusting water pressure and flow rates of toilets and hand washing faucets, along with using displays and notices and applying stickers as reminders for users to conserve water.



Rainwater storage tank

### Waste Recycling

#### Reducing Waste and Recycling

#### KIX

Approximately 11,000 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, KIX has established rules for waste separation in its "Regulations Governing the Use of Waste Processing Facilities" and reaches out to businesses operating at the airport, urging them to sort their waste. As a result, the amount of waste per passenger has declined, despite a somewhat higher amount of waste generated at the airport in fiscal 2017. The airport's recycling rate was 13.8% for general waste.

As for industrial waste, we have been encouraging businesses operating at the airport to manage waste properly, avoid creating waste, and recycle, in accordance with relevant laws and ordinances.

In addition, Kansai Airports Group is working to recycle office paper (multipurpose paper) to carry out more thorough sorting and recycling. Through the Airport Environmental Promotion Council set up at each of our airports, we plan to share this initiative with businesses operating at our airports to expand the scope to cover the entire airport.

#### Waste Reduction Initiatives by Businesses Operating on Airport Island

About 16% 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.

The Airport Environmental Promotion Council comprising representatives of businesses operating at the airport is working to raise awareness about waste reduction. Looking ahead, the councils plan on making recommendations to the Airline Operators Committee on initiatives for airlines to mitigate their environmental impacts.

#### ITAMI

Waste generated at ITAMI totals about 4,000 tons per year, with the terminal building being the main source. To promote recycling, ITAMI is working to increase its recycling rate by thoroughly sorting waste and reining in the occurrence of waste by using its grass clippings to make animal feed, reusing office supplies, carefully sorting and separating waste, and collecting recyclables. As a result, waste generated per passenger has declined and the recycling rate of general waste stood at 41.6%.

Through its Airport Environmental Promotion Council, ITAMI is sharing best practices and working to raise awareness about waste.



Waste is collected in separate bins for recycling, and different materials are handled separately



Preparation before resource recovery (examples of deconstructing, breakdown and sorting)

#### Initiatives as an Eco-Friendly, Resource-Recycling Airport

ITAMI produces about 1,000 tons of grass clippings annually from mowing the green spaces (landing strips) along the runways. These clippings are then fermented into animal feed (silage), provided at no cost to livestock farms and the Foundation for the Protection of Deer in Nara Park, as part of the airport's efforts to thrive with local communities. These clippings from the green spaces along the airport's runways provide a healthy, pesticide-free feed to cows and other livestock.



Grass mowing



Cow eating feed made from the airport's grass clippings

In May 2017, the airport built a warehouse to store grass clippings, which is used to protect the rolled clippings from humidity and enable long-term storage. Through this effort, around 50% of the grass clippings that were once incinerated are now successfully recycled.





Warehouse for storing grass clippings

Dried rolls



ITAMI won Silver at ACI\* Asia-Pacific Green Airports Recognition 2018 for reducing waste and lowering waste reduction costs by transforming grass clippings normally incinerated into feed that is provided to nearby livestock farms. The theme for Green Airports Recognition is determined every year, based on which airports in Asia-Pacific submit their initiatives. The theme for 2018 was minimizing waste. ITAMI became the first airport in Japan to receive this award from Green Airports Recognition for recycling grass clippings as animal feed. This also served as an excellent opportunity to widely spread initiatives taking place at Kansai Airports to other airports in Asia.

\* ACI: Airports Council International



ACI Asia-Pacific Green Airports Recognition 2018 awards ceremony

#### Waste Emissions and Recycling Rate

KIX				ITAMI			
(tons) 12,000 -		48	(%) -60	(tons) 12,000 -			(%) -60
10,000 -	32		- 50	10,000 -			- 50
8,000 -			-40	8,000 -	40.9 <b>O</b>	41.6	- 40
6,000 -	8,973	9,384	-30	6,000 -			- 30
4,000 -	14.1	13.8	-20	4,000 -	10	142	-20
2,000 -	o	•	- 10	2,000 -	2,304	2,071	- 10
0	1,481	1 <mark>,50</mark> 5	0	0	1 <mark>,60</mark> 3	1 <mark>,57</mark> 9	0
0 —	2016	2017	(FY)	0 —	2016	2017	(FY)

Recyclable waste Burnable waste Non-burnable waste Recycling rate



# **Harmonious Coexistence**

We will continue to work on reducing aircraft noise, conduct environmental monitoring appropriately and disclose monitoring results.

We are also working to create positive spaces where airport users can relax and feel comfortable while also maintaining and expanding green spaces and creating a biodiversity-friendly environment.



#### Measuring and monitoring 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 2017, as in the prior year, noise levels complied with environmental standards (maximum Lden 57 dB) at all land-based continuous monitoring stations and periodic monitoring sites.



KIX was built on an artificial island in Senshu Bay 5km from the coast to enable 24-hour-a-day operations as an airport that is pollution free and co-exists with surrounding communities. Since the new overland flight path was established in December 1998, the airport measures aircraft flight path and altitude as part of its noise monitoring efforts.

Currently, KIX examines flight path and altitude data for eight observational cross-sections and publishes the results.

#### Reducing aircraft noise

To reduce aircraft noise, we encourage airlines to

switch to quieter aircraft and closely monitor established flight paths and altitude. We ask the KIX Airline Operators Committee to take steps to ensure compliance with flight paths and to find ways to reduce aircraft noise.

- 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.
- Quieter flight procedures\*1 have been adopted to minimize noise from aircraft approaching the airport from Kitan Strait.
- Continuous descent flight procedures\*<sup>2</sup> have been adopted.
- \*1 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. \*2 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. KIX uses CDO during certain hours. Benefits of the method include reduced fuel consumption and reduced CO<sub>2</sub> emissions.

#### Complaints, inquiries, and responses

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. In fiscal 2017, the airport received a total of 19 complaints and inquiries.

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.

#### Measures to reduce emissions from Incineration Plant (Clean Center)

We separate general waste from the airport island into combustibles and recyclables, with combustible waste incinerated at the airport's Incineration Plant (Clean Center).

Emissions from incineration go through a filter-type precipitator. As a result, air pollutant levels such as nitrogen oxides are fully 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 (Clean Center).

#### **Emission gas measurements (dioxins)**

(TEQ/Nm <sup>3</sup> )			
6.0-			TEO (NL 3
5.0		Regulated standard Sr	ng-TEQ/INm <sup>3</sup>
4.0-			
3.0-			
2.0-			
1.0-	0.075	0.187	
0.0			
	2016	2017	(FY)

#### **Incineration Plant (Clean Center)**

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

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, 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 strict voluntary 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.



Incineration Plant (Clean Center)



Central control room

#### Advanced treatment of general wastewater

Gray water generated from each facility undergoes sophisticated treatment at the airport's Sewage Treatment Center. Water quality is carefully managed during each treatment process and water is discharged only after fully meeting regulated emission standards.

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.



#### Quality of water discharged (daily ave, COD)

(mg/L) 25 –			
20 –		Regulated stand	dard 19mg/L
15 –			
10 -	0	•	
5 –	9.0	9.0	
0			
	2016	2017	(FY)



#### **Harmonious Coexistence**

#### Wastewater treatment plant (Sewage Treatment Center)

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 Sewage Treatment Center, 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.

#### Average Volume Treated per Day in Fiscal 2017

#### Special wastewater **General wastewater**

2,201<sup>m³/day</sup> 225<sup>m³/day</sup>



Sewage Treatment Center



Sand filtration

### Monitor the Local Environment IIMI

#### Measuring and monitoring of aircraft noise

To monitor aircraft noise, ITAMI conducts continuous monitoring of noise levels at 10 locations in the airport region, and releases the results publicly.

The noise level exceeds the legal limit (Lden 57) in certain communities around the airport. To reduce the impacts of aircraft noise on these communities, the airport is working on measures at noise sources, improving airport layout, and measures in the vicinity of the airport.



#### Reducing aircraft noise

#### Measures at noise sources Restricting flight movements and hours of operation

Considering the impacts of noise on local communities, the airport has established a limit on aircraft movements for regularly scheduled flights of 370 movements per day (200 for jets and 170 for quieter aircraft).

In addition, airport operations are restricted to the 14 hours between 7:00 am and 9:00 pm.

#### Encouraging the use of quieter aircraft

ITAMI promotes the introduction of low-noise aircraft through a unique landing fee system, with discounts for low-noise aircraft and surcharges for high-noise aircraft, based on actual noise levels measured around the airport.

#### Noise abatement flight procedures

The airport employs the following noise abatament flight procedures in order to reduce the impacts of aircraft noise.

#### Rapid ascent (take-offs/departures)

To reduce aircraft noise on communities next to the airport, the airport has established flight procedures that require departing aicraft to rapidly ascend to 3,000 feet (about 1,000 meters).

### Delayed-flap approach and landings with low flap angle (landings)

The airport has established flight procedures that reduce engine noise and wind noise due to air resistance by controlling the necessary engine thrust and air resistance by having aircraft on approach delay the lowering of flaps and use the lowest flap angle possible when landing, in order to reduce aircaft noise on communities under the flight path.

#### Preferential flight paths

To minimize the range of aircraft noise impacts, aircraft taking off to the north are required to fly inside the area of (1) Chugoku Expressway Connector to the north, (2) Zuga Pond and Koya Pond to the south, and (3) Muko River to the west (see figure below). In addition, typically aircraft takeoff and land against the wind, but at ITAMI, aircraft most often use Runway 32 (operated in direction shown in the figure below), with flights taking off to the north and landing from the south, within the safe operation parameters of the aircraft, in order to reduce the range of aircraft noise impacts on the ground.



### Reducing aircraft noise from within the airport

#### Curtailing the use of reverse thrust at night

Jet aircraft landing on runway B between 7:00 pm and 9:00 pm are required to avoid the use of reverse thrust until idle within the safe operation parameters of the aircraft, in order to reduce aircraft noise at night for communities near the runway.

### Noise reduction measures during aircraft engine testing

The airport has erected a large noise barrier at the engine testing site in order to reduce noise during aicraft engine testing.



### Promoting use of GPUs and limiting use of APUs

In order to reduce noise impacts from auxiliary power units (APUs) while aircraft are parked, we are promoting the use of ground power units (GPUs).

#### Improving airport design

Noise barriers, noise protection embankments, and noise protection forests have been set up around the airport to reduce the impacts of noise from aircraft takeoffs and landings and use of the taxiways.



#### Measures in the vicinity of the airport

ITAMI carries out the following measures in the vicinity of the airport based on the extent of noise impacts on local communities.

#### General: Lden 57 or higher

- Financial assistance for soundproofing of schools,
- hospitals, common-use facilities, etc.Financial assistance for park improvements
- Financial assistance to make common-use and other
- facilities barrier-free
- Financial assistance for local events
- Financial assistance to purchase materials for schools, common-use facilities.
- Mobile health checkups



#### Harmonious Coexistence

#### Relocation compensation programs

In areas around the airport significantly affected by aircraft noise, the airport provides relocation compensation or purchases the land of buildings located in designated areas.

### Utilization of land acquired by relocation compensation program

The airport clears and plants trees on land purchased through the relocation compensation program located in Class 3 areas around the airport. As a result, a greenbelt (see photo below) that serves as a buffer zone between the airport and surrounding communities is taking shape.

With the progress of the relocation compensation program in Class 2 and 3 areas, there has been an increase in vacant sites (after residents have relocated) in the area. Responding to community concerns about losing local cohesiveness, the airport has been working to develop green space in a planned and integrated way, by having Class 2 and 3 areas and surrounding areas designated as green space, as defined under the nation's City Planning Act. Examples include the Itami Sky Park on the Hyogo Prefecture side and Fureai Ryokuchi (public green space) on the Osaka Prefecture side of the airport.

Also, the airport developed Air Front Oasis Shimogawara using land acquired in the Class 2 area as part of the relocation compensation program. This area aims to familiarize local residents with the airport through greenery and it also serves to improve the disaster prevention functions of the surrounding communities. As a result, the area improves the living environment of people in the surrounding communities along with disaster preparedness.

#### **Green buffer zones**

Green buffer zones created on sites after residents have relocated out of Class 3 areas near airport



#### **Itami Sky Park**

This green space was developed as a place of relaxation for the local community and is also designed to serve as a refuge area in time of disaster.



#### Fureai Ryokuchi (Friendship Green Square)

This area was developed as a green space for local residents and, based on their feedback, it features a multipurpose open space, tennis court, heated swimming pool, grass lawn, play equipment, and biotope, among other amenities.



### Air Front Oasis Shimogawara and Shimogawara Green Area

Air Front Oasis Shimogawara is well-located with a view of ITAMI. Its main feature is an observation deck with a commanding view of the daily activities at the airport, but it also includes a monument to the wind and other items with an aeronautical motif. Together with the Shimogawara Green Area provided by Itami City, it is a place for locals to relax and enjoy the play and athletic equipment, and rest area.



#### Soundproofing for communities surrounding the airport

In accordance with laws, ITAMI subsidizes part of the costs for soundproofing work of homes and educational facilities in communities that are significantly impacted by aircraft noise.

Category		Outline
Soundpro ofing of public facilities	Soundproofing of schools, etc.	If the aircraft noise exceeds intensity and frequency limits specified by legislation* related to aircraft noise prevention, a subsidy is provided to local governments and other bodies to defray part or the entire cost for work (soundproofing, installation of upgraded air conditioning) to prevent or reduce aircraft noise in facilities including schools, child care centers, and hospitals.
	Improvement of shared or common-use facilities	Based on legislation*, a subsidy is provided to local governments where noise reaches Lden 57, to defray the partial cost for improvements of shared or common-use facilities used by local residents for learning and other purposes. Eligible work includes new construction, renovation, installation of upgraded air conditioning.
Soundpro ofing of housing	Soundproofing of housing	Based on legislation <sup>*</sup> , a subsidy is provided to defray the partial cost for work to prevent or mitigate aircraft noise (soundproofing, installation of upgraded air conditioning) on housing that was located in Class 1 areas when the national government made the designation.

\* Act on Prevention of Damage caused by Aircraft Noise in Areas around Public

#### Other programs

In addition to legally mandated programs, ITAMI provides mobile health checkups and subsidizes part of the costs of community events and park development by local governments in communities that are significantly impacted by aircraft noise.

Category		Outline
Other Mobile health checkups		To promote the good health of residents living near the airport, mobile health checkups are offered, particularly for people who live in areas with greater amounts of aircraft noise.
	Environmental improvements in surrounding areas	In order to improve the living environment around the airport, this program offers subsidies for efforts of local governments, to improve noise-measuring equipment, develop parks, make public facilities more accessible, support equipment purchases by schools and public facilities, revitalize the area, and other activities.

#### Complaints, inquiries, and responses

The airport responds to complaints and inquiries appropriately, sharing this information between relevant parties in a timely manner.

ITAMI receives complaints and inquiries about

aircraft noise and flight paths because of its location in an urban area. In fiscal 2017, the airport received a total of 95 complaints and inquiries.

### Preserve Biodiversity

#### Establishing Seaweed Beds

#### KIX

At Kansai International Airport, we take an active approach to establishing vibrant seaweed beds surrounding the airport island to provide additional habitat for marine life in Osaka Bay. At the time of the airport island construction, sloping rock-fill seawalls were primarily used and efforts were put into developing the reclaimed shallow areas. As a result, there is rich growth of seaweed around the airport island which serves as habitat for various species of fish and shellfish. At present, the airport aims to maintain as well as expand the growth of high-quality seaweed beds by conducting various surveys and experiments including monitoring their condition. In addition to periodic monitoring, the airport has carried out experiments to expand the declining beds of Ecklonia cava (a brown seaweed native to Japan) by transplanting donor algae because this species of seaweed creates an underwater forest habitat for fish and shellfish. Based on the survey



Sloped rubble mound seawall

conducted in fiscal 2017, the airport confirmed the presence of seedlings surrounding the transplanted donor algae. Going forward, the airport will continue monitoring the situation to develop a vibrant seaweed bed environment.



Sloped rubble mound seawall (with wave-dissipating blocks)Sloped rubble mound seawallOther types of seawall



Juvenile rockfish gathered in the Garamo field



Sargassum filicinum etc

Eisenia bicyclis



#### Island Greening and Scenic Improvement Projects

#### KIX

Aiming to preserve landscapes and create spaces for rest and relaxation on the airport island, we are working to improve the flower spots.

Moreover, on the Phase 2 airport island, we have created areas for plants such as seashore pink, coastal moneywort, shore bindweed and beach vitex in order to restore and protect shoreline vegetation of the Osaka Bay area.

The airport has created a large-scale green space of approximately 4 hectares called KIX Sky Park that is open to the public. It is home to a grassy area for visitors to watch aircraft taxi, take off and land, as well as KIX Sky Farm, which grows crops while recycling cut grass from ITAMI by composting them into fertilizer. Also a green space is found in between Phase 1 and 2 airport islands that faces the inner water way. The green space provides visitors with jogging and walking courses that can be enjoyed while taking in the scenery of both the sea and greenery.

At the annual Dragon Boat Festival on the inner waters, teams from Japan and around the world join in heated competitions, with the international airport as a backdrop.



#### ITAMI

At ITAMI, we are committed to improving landscaping and creating a comfortable environment through rooftop greening along with a rooftop deck and planters set up inside the passenger terminal building.





#### KIX ITAMI

#### Planting of Cherry Trees

In February 2018, cherry tree seedlings were planted at both KIX and ITAMI. Cherry trees are adored by both Japanese and foreign travelers alike. The seedlings were planted by first- and second-year employees of Kansai Airports Group, with the aim of cultivating both the trees and airports at the same time, thereby enabling passengers and community members alike to enjoy the cherry trees.







# **Environmental Management**

Utilizing an environmental assessment program, we are working to better understand and evaluate our impacts on the environment and establish a mechanism that can mitigate these impacts. In addition, we hold dialogue with passengers, airport officials and community members, by providing a place for sharing environmental information and learning about the environment, and through proactive collaboration with airport related businesses and other airports inside and outside of Japan.

# 

#### Airport Carbon Accreditation

December 2016, our efforts to reduce CO<sub>2</sub> emissions were recognized by the Airports Council International (ACI) when KIX and ITAMI received Airport Carbon Accreditation (ACA) Level 2\*. We will continue our efforts in collaboration with airport businesses to reduce CO<sub>2</sub> emissions.

\* Airport Carbon Accreditation is an international evaluation and accreditation program/system to manage and reduce CO<sub>2</sub> emissions from airports. It is the only environmental accreditation program designed specifically for airports. ACA has four levels for carbon management: Mapping (Level 1), Reduction (Level 2), Optimisation (Level 3), and Neutrality (Level 3+).



# Cooperation and Education

#### Dissemination of Environmental Information

We established a webpage containing environmental information on our website that includes details on environmental monitoring, environmental reports, and environmental events.

ITAMI's website provides information about its environmental programs including noise abatement subsidies offered to businesses and residents near the airport.

KIX has installed monitors in the terminal buildings and Observation Hall public area to display the status of electricity generation by photovoltaic panels (KIX Megasolar). The public can view information such as electricity generated to date, CO<sub>2</sub> emissions reduced, and the current sunlight intensity.



Dialogue with local communities

### KIX

#### Trial Rides Aboard Fuel Cell Bus

For six days from May 27, 2017, we were the first in Western Japan to conduct trial operations of a fuel cell bus that runs on hydrogen. This bus model made by Toyota Motor Corporation was launched in February 2017. During the trial period, the fuel cell bus was fueled up with hydrogen at the Iwatani Hydrogen Station on the airport island and then provided rides to the general public at Kanku Tabihaku 2017 and

test rides to Terminal 2. This provided the opportunity for many people to experience riding aboard a fuel cell bus



#### **Smart Island Environmental Exhibition**

KIX held the Smart Island Environmental Exhibition inside the Terminal 1 building timed to coincide with national Environment Month in June. The exhibition featured panel displays on Kansai Airports

Environmental Declaration along with the use of clean energy, as well as reducing waste, recycling water and conducting environmental monitoring at airports, with

a focus on Airport Carbon Accreditation (ACA). This is because KIX and ITAMI were the first two airports in Japan to obtain this accreditation.



#### **KIX Eco Classes**

We grow seasonal vegetables using fertilizer completely free of pesticide made of grass clippings from ITAMI at KIX Sky Farm, which is located inside KIX Sky Park. In June, we invited children from local daycares to join us for a potato harvest event.

#### **KIX Science Class**

We held the KIX Science Class for middle and upper grades of elementary school. During the first half of the class, we held a hydrogen bubble experiment and an



electrolysis experiment to teach about hydrogen energy. In the second half, we held an experiment using three types of lights (fluorescent, incandescent, and LED) to share info about eco-friendly lighting. All the participants enjoyed learning about energy in a fun setting. Cooperation: Iwatani Corporation and Panasonic Corporation

#### Exhibit at EcoPro 2017

The 2017 EcoPro International Exhibition on Environment and Energy took place at Tokyo Big Sight for three days from December 7. The exhibition's theme was realizing a sustainable society. We hosted a booth at the event together with other airport related businesses in Japan.



#### Cooperation with businesses at the airport

#### **Airport Council initiatives**

We have set up councils comprising representatives from airport related businesses at each of our airports to share best practices and engage in various efforts together with these businesses aimed at mitigating environmental impacts. These efforts include energy conservation, reducing CO<sub>2</sub> emissions, reducing waste, and encouraging the use of eco-friendly vehicles. The stop idling campaign held every year at Kansai International Airport together with council members was expanded to ITAMI in fiscal 2017. Together with a total 40 businesses and 150 airport officials, we called for increased awareness of environmental conservation and active participation in environmental conservation activities at both airports. In addition, on May 30 we held a zero-garbage campaign to make our airports cleaner for passengers.

#### Participation in Airports Council International (ACI)

Kansai Airports is a member of Airports Council International, an organization representing 641 organizations that manage 1,953 airports in 176 countries and regions around the world (as of January 2018), and a member of the ACI Asia-Pacific Regional Environment Committee. The eighth meeting of this committee was held in April 2017 followed by the ninth meeting of the committee in March 2018 to discuss airport environmental actions.





#### **Review of Previous Plan up to 2017**

Up to fiscal 2017, we carried out initiatives under the Smart Island Promotion Plan for Kansai International Airport and the Osaka Airport Environment Plan for Osaka International Airport. This section reviews the data items of each airport's environmental promotion plan along with achievements based on the evaluation methodology.



# **Review of the Smart Island Promotion Plan** (fiscal 2013 to fiscal 2017)

Fully achieved target Generally achieved target (90% to 100%) Generally achieved target (achieved below 90%)								
	Item	Objective	FY2017 achievements	Rated				
	Aircraft noise							
	Reduce aircraft noise, introduce low-noise aircraft							
	Ensure compliance with proper flight paths	Maintain 100% achievement of environmental standards	Continued to achieve 100% (Lden 57 or less)	<b>e</b>				
	Consider runway operations, make requests to concerned organizations							
	Air quality protection							
(1) An airport that respects the local	Encourage the introduction of aircraft with low emissions of air pollutants	Appeal/request, best effort.	Appealed to relevant organizations	•				
environment	Emission reduction measures at incineration plant (Clean Center)	Voluntary target of 70 ppm or lower concentration of NOx emissions	30 ppm (average)	<b>e</b>				
	Improve fuel quality of jet fuel tanker trucks	(Government standard is 187 ppm)	100% good quality fuel is being used	•				
	Water quality protection							
	Reduce impacts of water	COD level of treated wastewater discharge: Daily average 10 mg/L or lower	COD daily average 9.0 mg/L					
	discharge from wastewater treatment plant	Daily COD load never to exceed 30 kg/day (1/6th the level predicted by environmental impact assessments)	Daily COD load 5.9 kg/day	•				

	ltem	Objective	FY2017 achievements	Rated				
	Energy conservation measures							
	Introduce energy-efficient equipment	For new construction or upgrades, use only LED lighting for buildings/facilities and all airport lighting.	Switched to LED when updating lighting for the cargo terminal ceiling, streetlights, Terminal 1 restrooms, and storage rooms, etc.	<b>e</b>				
	Promote energy-efficient operations	1% average annual reduction in energy intensity of operations managed by the airport operator	Average 3.9% annual reduction for past 5 years	_				
	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	15.7% reduction (reduction from 2.80 tons in FY2011 to 2.36 tons per LTO cycle)	•				
	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 80.2%	•				
	ldling prevention awareness campaigns	Appeal/request, best effort.	Held the idling stop campaign on June 6, 2017 through the Smart Island Promotion Council. Appealed to drivers of trucks, limousine buses, taxis and passenger cars using the airport by handing out informative leaflets and fans.	•				
	Promote public transportation	Appeal/request, best effort.	Called on airport users to utilize public transportation	•				
	Reduce greenhouse gas	Reduce GHG emissions (per landing-takeoff cycle) from airport facilities (excluding aircraft) by 5% compared to FY2011	<ul> <li>Reduced 44.8% (reduced from 1.17 tons/LTO in FY2011 to 0.64 tons/LTO)</li> <li>Acquired Airport Carbon Accreditation (ACA) Level 2</li> </ul>	•				
	emissions from airport facilities	Reduce plastics content 10% or less	Plastics content dropped to 22.7% of garbage brought to airport island incineration facility.	•				
	Promote introduction of eco-cars							
(2) An airport with minimal impact on the global	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) Considered introducing eco-friendly vehicles when updating the fleet.					
environment		Eco-car ratio 80% (commercial vehicles used on island)	Fleet ratio 25.1% (534/2,144 vehicles) Encouraged the introduction of eco-friendly vehicles through airport councils					
		Trial use of hydrogen fuel cell vehicles, as appropriate.	<ul> <li>February 2015: Began trial operations of fuel cell forklift, becoming the first airport in Asia to do so, as part of real life testing adopted by the Ministry of the Environment.</li> <li>2016: Introduced first commercially available model</li> <li>January 2016: Completed construction of large-scale hydrogen station on 2nd phase airport island.</li> <li>April 2017: Commenced operations of hydrogen station for industrial vehicles.</li> </ul>	•				
		Implement in cooperation with related parties	<ul> <li>Considered promoting the spread of trucks, limousine buses and airport island shuttle buses with less pollution (CNG vehicles) with the cooperation of the Ministry of Land, Infrastructure, Transport and Tourism, businesses, and other related organizations.</li> <li>Conducting real life testing of fuel cell vehicles utilizing the airport's hydrogen station.</li> </ul>					
	Expand the use of clean energy							
	Expand the installation of hydrogen fueling stations	Best effort	<ul> <li>Utilizing the hydrogen station at the airport, introduced two hydrogen engine cars that are still in use today.</li> <li>Continued implementing the hydrogen grid project</li> </ul>	•				
	Install CNG fueling stations	Consider	Considering construction of CNG stand with the cooperation of the Ministry of Land, Infrastructure, Transport and Tourism and gas companies.	•				
	Install electric vehicle charging stations	Best effort	Installed a total of 10 EV charging stations that are now operating.	•				
	Implement solar power projects	Locally-generated energy accounting for equivalent of 10% of electricity consumption on	Energy creation ratio: 9.7%					
	Use clean energy	airport island						

### Review of Previous Plan up to 2017

	Item	Objective	FY2017 achievements	Rated				
	Achieve zero emissions							
	Reduce general waste volume. Recycle resources.	13% recycling rate for general waste	Recycling rate: 13.8%	•				
	Reduce industrial waste volume. Recycle resources.	Appeal to businesses/operators on airport island	Requested appropriate disposal and curtailment of industrial waste and reuse of waste plastics from dismantling of packaging.	•				
(3)	Effective use of construction byproducts	100% recycling of soil/sand from projects on island	Recycling rate: 100% Effectively utilized during airport construction work.	•				
An airport that recycles resources	Green purchasing	Continue efforts	Considered selection of green products when introducing applicable products.	•				
	Water conservation, wate	r recycling						
	Promote water conservation actions	Reduce clean water consumption by 5% from FY2011 levels (per landing/takeoff cycle)	Reduced by about 47% (from 7.5 to 4.0 m <sup>3</sup> /LTO) Encouraged relevant parties to save water, with use of automatic taps, water-conserving devices.	<b>A</b>				
	Use reclaimed water 55% usage rate (percentage of wastewater reclaimed/recycled)		Water recycling ratio: 59% Encouraged the use of reclaimed/recycled water.					
An airport that recycles resources	Natural environment							
	Protect/grow seaweed beds, coastal vegetation	Maintain seaweed beds. Aim for 20% increase above FY2010 (was 47 ha).	<ul> <li>Seaweed habitat, area: 53 ha (studied Mar. 2016), 13% increase over FY2010</li> <li>Carried out initiative to increase and maintain high quality seaweed beds by transplanting donor algae of Ecklonia cava (a brown seaweed native to Japan).</li> </ul>	•				
	Expand greenery on airport island	Expand greenery on airport island by 20%	Continued with greening efforts on airport island.	•				
	Scenic views							
	Protect landscape/views on airport island		Worked to protect scenic views; KIX Sky Park; KIX Sky Farm; water features along inner water between airport islands; terminals; etc.					
	Create spaces for resting and relaxation	Continue errorts	Created spaces for resting/relaxation by using inter-island water area, KIX Sky Park.					
	Information provision							
	Publish environmental monitoring data	Ongoing release of monitoring data. Prepare Environmental Report each fiscal year.	<ul> <li>Published environmental monitoring data (aircraft noise, air quality, water quality, etc.), environmental reports on website, etc.</li> <li>Installed monitors showing electrical generation of solar panels (KIX Megasolar), visually displaying environmental information.</li> </ul>	•				
	Dialogue with the local community							
	Provide environmental information	Provide website, reports, pamphlets	Published environmental management plans, environmental reports, environmental monitoring data, and other information on our website.	•				
(5) An airport coexisting with the local region	Provide opportunities for environmental education, etc.	Continue efforts	<ul> <li>Provided a venue for learning about the environment at the Environmental Center in the Sky View Observation Hall.</li> <li>Held the Smart Island Environmental Exhibit on the second floor of the Terminal 1 building introducing environmental initiatives.</li> <li>Held KIX Science Class, an interactive class for students in middle and upper grades of elementary school.</li> <li>Invited children from local daycares to take part in a potato harvest event at KIX Sky Farm, an eco-friendly farm that uses pesticide-free fertilizer made from grass clippings from Osaka International Airport.</li> <li>Hosted an airport booth together with airport related businesses at EcoPro 2017 International Exhibition on Environment and Energy.</li> </ul>	٩				
	Cooperation with airport	-related businesses						
	Coordinate Smart Island Promotion Council	Continue efforts	Promoted environmental conservation and creation by working with businesses on airport island through council meetings and various initiatives.					
	Collaborate with other airports in Japan and overseas	Continue efforts	Participated in the environmental committee for the Asia-Pacific region established by Airports Council International (ACI).					

### ITAMI Review of Osaka International Airport Environment Plan (fiscal 2006 to fiscal 2017)

The progress of major initiatives for each environmental element of Osaka International Airport and achievement of targets is presented below.

Progress toward targets Progress of initiatives	А	В	С
Average: 3.5 or higher	<b>e</b>	<b>e</b>	•
Average: 2.5 to less than 3.5	<b>e</b>	•	•
Average: less than 2.5	•	8	•

#### Progress toward targets

A: Steadily progressing toward target B: No change from reference year

C: Worse than the reference year

Note: Reference year: fiscal 2006 for clean water consumption and soil, and fiscal 2001 for all others

#### **Progress of initiatives**

- 5: Achieved 4: Progressing steadily

- 3: Progressed 2: Moving away from target
- 1: Far from reaching target

ltem	Target	Progress	Fiscal 2017 results	Progress	Score
			(1) Promote the use of low-emission aircraft engines	4	
			(2) Expand GPU usage as much as operations permit	4	
			(3) Promote the use of eco-friendly vehicles for ground support equipment (GSE), considering technological development	4	
Air and energy	Reduce CO <sub>2</sub> emission as much as possible	A	(4) Promote the adoption and efficient use of energy-efficient lighting and air conditioning	4	<b>e</b>
			(5) Use thorough organizational approach to energy-saving behavior	5	
			(6) Convert building boilers to gas fuel	5	
			(7) Organizationally promote idling prevention campaigns	5	
			(1) Promote the introduction of low-noise aircraft	4	
Noise and vibration	Reduce noise and vibration by using low- noise equipment/vehicles and ground power units (GPUs)	A	(2) Promote the use of GPUs	4	<b>e</b>
			(3) Convert to low-noise vehicles for GSE-related vehicles	4	
	<ul> <li>Reduce clean water use continuously by 2% annually from fiscal 2006</li> <li>Consider using reclaimed water by installing advanced treatment facilities</li> </ul>	в	<ol> <li>Promote water-conservation by installing automatic faucets for handwashing, water- conserving equipment and parts</li> </ol>	4	
Water			(2) Raise water conservation awareness of airport users and others through awareness campaigns	4	<b>e</b>
	at the time of new construction, additions or upgrades to buildings.	В	(3) Continue investigating the use of clean water at the airport	5	
Soil	<ul> <li>100% ratio of use of acetic acid, formic acid-based snow-melting agent</li> </ul>	A	(1) Shift from urea type to acetic acid, formic acid-based snow-melting agent, which is more eco-friendly	5	
501	Use less anti-icing/deicing fluid	В	(2) Consider measuring water quality when there is an increase in use or change in type of chemicals used	4	σ
			(1) Raise environmental awareness through campaigns and promote environmental literacy	4	
	As target for waste reduction, do not generate more general waste than in fame 2001	A	(2) Regularly and continuously investigate and analyze the amount of waste generated	5	
Waste	<ul> <li>Exceed 30% as the recycling rate for general waste</li> </ul>	A	(3) Encourage proactive reuse of used products	5	<b>e</b>
	• Exceed 32% as the recycling rate for industrial waste	в	(4) Reduce volume and improve recycling rates of waste	4	
			(5) Promote green purchasing	3	
Nature	Maintain the existing area of green space on the airport grounds and promote more greening and conservation to the extent possible	A	(1) Continuously care for and maintain greenery at the airport	5	
Other	Steadily increase the utilization rate of	P	<ol> <li>Promote public awareness activities targeting travelers and travel agencies, based on stakeholder cooperation and collaboration</li> </ol>	3	
Other	public transportation	L R	(2) Encourage drivers to use public transportation instead of private cars	3	

### KIX

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 1978	10	Marine observation facilities completed
	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
	2	Kansai Int'l Airport Env. Monitoring Org. established (Osaka Pref. Governor, mayors of 9 cities, 4 towns currently)
1986	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
	1	Phase 1 airport island construction areas completed
1994	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
	6	Environmental Monitoring Plan for Phase 2 Construction Project adopted
1999	/	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
	1	KIAC establishes Environmental Management Committee
2001	4	KIX receives Monument of the Millennium award from American Society of Civil Engineers, as offshore airport
2001	0	NAC adopts Environmental Management Plan (Eco-Island Plan)
	9	Placement begins for wave-dissipating blocks to support seaweed bed growth along Plase 2 seawall
	10	International Airport symposium 2001 hosted, Phase 2 airport Island seawail completed
2002	10	KIAC adopts Regulations Governing the Ose of Waste Processing Facilities
2002	12	KIAC establishes Energy Conservation Committee     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 MITI Award at FY2006 Nat'l Energy-Efficiency Best Practices Conf., for IT-based air con system in passenger terminal
	5	JHFC hydrogen charging station for vehicles opens at KIX
2008	3	KIX Eco-Island Promotion Council launched     KIX Environmental Plan adopted

Year	Mo.	Event
2008	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
2000	7	Full-scale use of truck-mounted ground power units (GPUs) begins
2005	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)
2010	9	Photovoltaic system installed for temperature-controlled building for medical products
	1	IATA Environment Stand display installed at KIX
2011	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)
	4	<ul> <li>New Kansai International Airport Company (NKIAC) established</li> <li>Professor KIXeco quiz system launches at Environmental Center</li> </ul>
	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
2012	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
	12	Exhibit at Eco-Products 2012 exhibition. Four regular chargers for electric vehicles installed in parkade.
	2	Int'I Strategy Comprehensive Special Area expanded by Kansai Innovation to include KIX (green innovation theme)
	3	<ul> <li>Smart Eco Logi Council holds ceremony for launch of 20 large CNG trucks in international freight zone</li> <li>KIX Eco-Island Promotion Council changes name to KIX Smart Island Council</li> </ul>
2013		
2013	4	KIX Smart Island Plan adopted
2013	4	KIX Smart Island Plan adopted         Summer Vacation Family Eco Classes held
2013	4 8 10	KIX Smart Island Plan adopted         Summer Vacation Family Eco Classes held         East Asia Airport Alliance (EAAA) annual general meeting held. "Environmental Relay Declaration" adopted
2013	4 8 10 12	KIX Smart Island Plan adopted         Summer Vacation Family Eco Classes held         East Asia Airport Alliance (EAAA) annual general meeting held. "Environmental Relay Declaration" adopted         Exhibit at Eco-Products 2013 exhibition. Winter Vacation Family Eco Classes held.
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2013	4 8 10 12 1 2 5 6 7 7 2 8 8 9	KIX Smart Island Plan adopted         Summer Vacation Family Eco Classes held         East Asia Airport Alliance (EAAA) annual general meeting held. "Environmental Relay Declaration" adopted         Exhibit at Eco-Products 2013 exhibition. Winter Vacation Family Eco Classes held.         KIX announces event for EAAA Environmental Relay         KIX Megasolar starts generating electricity (largest photovoltaic system of any Asian airport)         Hydrogen Grid Project launched         Rapid charger installed for electric vehicles at open parking lot No.5, with 24-hour operations         • "Megasolar Observatory" and "Visualization Monitor" start operating         • Small wind turbine power generator installed—a first for any Japanese airport         Trial operations launched for first fuel cell-powered forklift at any airport in Asia, plus demonstration trial of hydrogen grid         "Hydrogen and Fuel Cell" Family Eco Classes held         Megasolar system starts operating on roof of air freight warehouse in international freight zone
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2013 2014 2015 2015	4 8 10 12 5 6 7 2 8 9 10 12 1 1 3 4	KX Smart Island Plan adopted         Summer Vacation Family Eco Classes held         East Asia Airport Alliance (EAAA) annual general meeting held. "Environmental Relay Declaration" adopted         Exhibit at Eco-Products 2013 exhibition. Winter Vacation Family Eco Classes held.         KIX announces event for EAAA Environmental Relay         KIX Megasolar starts generating electricity (largest photovoltaic system of any Asian airport)         Hydrogen Grid Project launched         Rapid charger installed for electric vehicles at open parking lot No.5, with 24-hour operations         • "Megasolar Observatory" and "Visualization Monitor" start operating         • Small wind turbine power generator installed—a first for any Japanese airport         Trial operations launched for first fuel cell-powered forklift at any airport in Asia, plus demonstration trial of hydrogen grid         "Hydrogen and Fuel Cell" Family Eco Classes held         Megasolar System starts operating on roof of air freight warehouse in international freight zone         Exhibit at Elow-Products 2015 Environment Minister's Award for Global Warming Prevention Activities         • Exhibit at Eco-Products 2015 exhibition         Largest hydrogen statin at an airport in Asia opens         • Awarded 2015 Kansai Eco Office Grand Prize from Union of Kansai Governments         • Two new model fuel cell forklifts added for demonstration trials         • Kansai Airports starts operating         • Kansai Airports starts operating
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### **Environmental Chronology**

Year	Mo.	Event
2017	1	Terminal 2 opens (international flights)
	4	Large hydrogen filling station for industrial vehicles opens, a first in Japan
	5	Conducts trial operations of fuel cell bus at Kanku Tabihaku 2017 and to the Terminal 2 building
	6	<ul> <li>Hosts Smart Island Environmental Exhibition</li> <li>Holds KIX Eco Class at KIX Sky Farm</li> <li>Holds idling stop campaign</li> </ul>
	8	Holds KIX Science Class
	12	Exhibits at 2017 EcoPro International Exhibition on Environment and Energy
2018	4	Establishes new environmental plan called One Eco-Airport Plan

#### ITAMI

Year	Mo.	Event
1939	1	Opens as No. 2 Osaka Airport
1958	3	Complete return of airport from U.S. forces to Japan. Renamed "Osaka Airport" by the Ministry of Transport (runway was 1,828 m long)
1959	7	Designated a class 1 airport under Civil Airport Development Law, renamed "Osaka International Airport"
1960	4	International flights begin
1964	6	Passenger jet service begins
1969	1	Construction of terminal building completed
1970	2	Additional runway (3,000 m) opens and airport takes its present form
1994	9	International flights shift to newly opened Kansai International Airport
1997	4	Osaka Monorail starts operation
1999	7	Former international terminal building is renovated and opens as South Terminal
2002	6	Erects noise barrier at the engine testing site
2006	4	Switches from 24-hour operations to 14-hour operations (7:00am to 9:00pm)
2010	4	Begins examining ways of reducing amount of grass clippings incinerated as waste (recycling as fertilizer and feed)
	4	New Kansai International Airport Company established
2012	7	Management of Osaka International Airport and Kansai International Airport is integrated
	10	Successfully produces fertilizer made of grass clippings from the airport's landing strips
2013	3	Introduces landing fee system based on actual noise level
	2	Receives 7th Toyonaka Eco Citizen Award 2013 (for recycling grass clippings as fertilizer and feed)
2014	9	Receives the Grand Prize at the 2014 Osaka Environmental Awards (for recycling grass clippings as fertilizer and feed)
	10	Receives the Chairman's Prize at the 2014 Reduce, Reuse, Recycle Promotion Merit Awards (for recycling grass clippings as fertilizer and feed)
2015	12	Kansai Airports starts operations
2016	4	Kansai Airports begins operating Osaka International Airport and Kansai International Airport
	5	Constructs warehouse for storing grass clipping feed
2017	6	Holds idling stop campaign
	12	Exhibits at 2017 EcoPro International Exhibition on Environment and Energy
	3	Receives Silver at ACI Asia-Pacific Green Airports Recognition 2018 (for recycling grass clippings as feed)
2018	4	<ul> <li>Terminal renovations: Central Area opens first with light-blocking panels and rooftop greenery, etc.</li> <li>Establishes new environmental plan called One Eco-Airport Plan</li> </ul>

#### KOBE

Year	Mo.	Event
2006	2	Open Kobe Airport
2018	4	<ul> <li>Kansai Airports Kobe begins operating Kobe Airport</li> <li>Establishes new environmental plan called One Eco-Airport Plan</li> </ul>



### Number of passengers and flights

#### Annual Passenger Traffic



(Tens of thousands of tons) 120 -100 -13.7 12.6 13.3 80 -13.1 11.3 13.2 12.0 13.3 12.8 60 -84.7 40 -75.0 74.1 71.2 72.6 68.7 70.0 67.1 63.4 20 -0 2007 2008 2009 2010 2011 2012 2013 2014 2015

Osaka International Airport

Annual Cargo Volume

Kansai International Airport

38

13.3

85.2

(FY)

2017

13.4

75.3

2016

Queries: **Kansai Airports Technical Department, Smart Island Group E-mail: kankyo@kansai-airports.co.jp** Published: February 2019