



Upper left: Narita International Airport  
Bottom right: NARIKOH Clean Center, a waste disposal facility



## Waste Recycling Initiatives at Narita International Airport

### Thermal Recycling Power Generation and Composting

Narita International Airport generates about 70 tons of waste every day!

In Special feature One, we introduce the methods to dispose of daily generated waste and the recycling system based on the practice of the 3Rs (Reduce, Reuse, Recycle).

NARIKOH Clean Center, which handles waste disposal at the airport



### Seventy Tons of Daily Waste, Where From and Where To?



Narita International Airport handles every day more than 110,000 passengers and more than 6,000 tons of international air cargo. A lot of **waste (garbage)** is discharged from various places in the airport, amounting to **about 70 tons per day**.

#### 1 General Waste from Passenger Terminal Buildings

The passenger terminals are used by many passengers, airport staff, and plenty of tenants, including restaurants. Consequently, a variety of waste is generated. To promote selective recycling, sorted recycling bins are installed in various places. General waste discarded there is collected in waste processing rooms in the basement, where it is sorted into burnables and recyclables consisting of glass bottles, cans, plastic bottles, newspapers, magazines, cardboard, and shredded paper.



Sorted recycling bins in terminal building

#### 2 Inflight Waste

The greatest volume of general waste produced at Narita International Airport is unloaded from aircraft, which comprises about half of the total amount. General waste is discharged not only from passenger aircraft but also from cargo aircraft. For animals and plants entering Japan from abroad, a strict quarantine and sanitary control system has been put in place to prevent ingress of harmful organisms into Japan. Inflight meal leftovers from international flights must be incinerated by law because they are potential biosecurity risks owing to their overseas provenance.

#### 3 Destination of the Collected General Waste

Like the general waste from passenger terminals, the general waste discharged from the airport, such as aircraft, the cargo area, and the maintenance area, is gathered by type at specified locations, and then trucked to **NARIKOH Clean Center adjacent to the airport**. Approximately 50 truckloads of general waste are discharged from the airport every day. Upon arrival of a truck at NARIKOH Clean Center, the general waste it carries is weighed while still on the truck, and the waste is then taken from the platform of the general waste disposal facility to a waste pit, where a crane feeds the waste to an incinerator. Waste incineration is done a fixed amount at a time. After about one and a half hours, the waste completely turns into ash, which is ultimately disposed of at a landfill.

All recyclable general waste gets recycled according to its type. For example, plastic bottles are turned into plastic containers and fibers, while glass bottles are recycled into construction materials.



Weighing of general waste on board truck

#### Raising Awareness of Children, Leaders of Next Generation, about Recycling

#### Third Eco-Tour Program of Eco-Kids Club 2017

"Narita Airport Eco-Kids Club" for fifth and sixth graders organizes an eco-tour three times a year. To the children who will lead the next generation, we offer the opportunity to learn about the environmental initiatives being implemented at Narita International Airport, and realize the importance of protecting the environment by experiencing the natural environment around the airport.

In March 2018, under Eco-Kids Club 2017's Third Eco-Tour Program, 45 children visited Nariokh Clean Center to deepen their understanding of waste disposal and recycling. After receiving an explanation about the treatment of the waste discharged from the airport, the Eco-Kids actually visited the central control room of the waste disposal facility and looked at the garbage collection trucks, and then visited the composting facility that makes compost out of the kitchen waste generated by Narita International Airport. The latter facility was filled with kids' voices saying things such as "This is my first time seeing kitchen waste turned into fertilizer!" and "Compost has a nostalgic smell."



Experiencing empty can recycling



Listening to an explanation of thermal recycling



# Waste Recycling Initiatives at Narita International Airport

Thermal Recycling Power Generation and Composting

## Efficient Use of Generated Thermal Energy and Generating Power through Thermal Recycling

Narita International Airport promotes the **3Rs of waste** (Reduce, Reuse, Recycle) to minimize the burden on the environment. As part of this approach, NARIKOH Clean Center conducts **thermal recycling** through the incineration of general waste. Thermal recycling refers to **the collection and use of the thermal energy generated by the incineration** of general waste, and NARIKOH Clean Center makes efficient use of the **generated thermal energy to produce electricity**.

As shown below, the collected general waste is carried from the platform to the waste pit (marked with "START" in the flow sheet), where a crane operated from the central control room mixes, stirs, and fluffs the waste for better air flow and **uniform combustibility**. Then the well mixed general waste is loaded into the waste hopper and burned in the incinerator at temperatures of 850 degrees Celsius (°C) or higher. The incineration of waste at these high temperatures **breaks down any harmful substances** emitted by the waste. General waste incinerated at high temperatures turns

into ashes weighing just 12% of the pre-incineration weight. After the ashes are treated to minimize dust outflow, they are loaded from the ash bunker onto trucks and taken to landfills.

The high-temperature gases of 850°C or higher generated during the incineration of waste are transferred to the waste heat boiler, where the heat is used to produce steam in a process called heat exchange, and this **steam is in turn used to produce electricity**. Following its use for electricity generation, the steam is converted back into water for circulation and reuse.

The exhaust gases that leave the boiler are sprayed with water in the temperature reduction tower, which instantly lowers their temperature to below 200°C to **prevent the re-synthesis of harmful dioxins**. Next, harmful substances are removed with a catalytic bag filter or catalytic denitrator, and the resulting **harmless exhaust gases** are discharged from the stack. NARIKOH Clean Center uses a **closed system** that employs used water as spray water in the temperature reduction tower to prevent any discharges outside the center.

Moreover, as part of its strict efforts to prevent the release of harmful substances, the center has **adopted numerical values far more stringent than the national standard** for the exhaust gases it releases into the atmosphere.



Steam turbines and generators

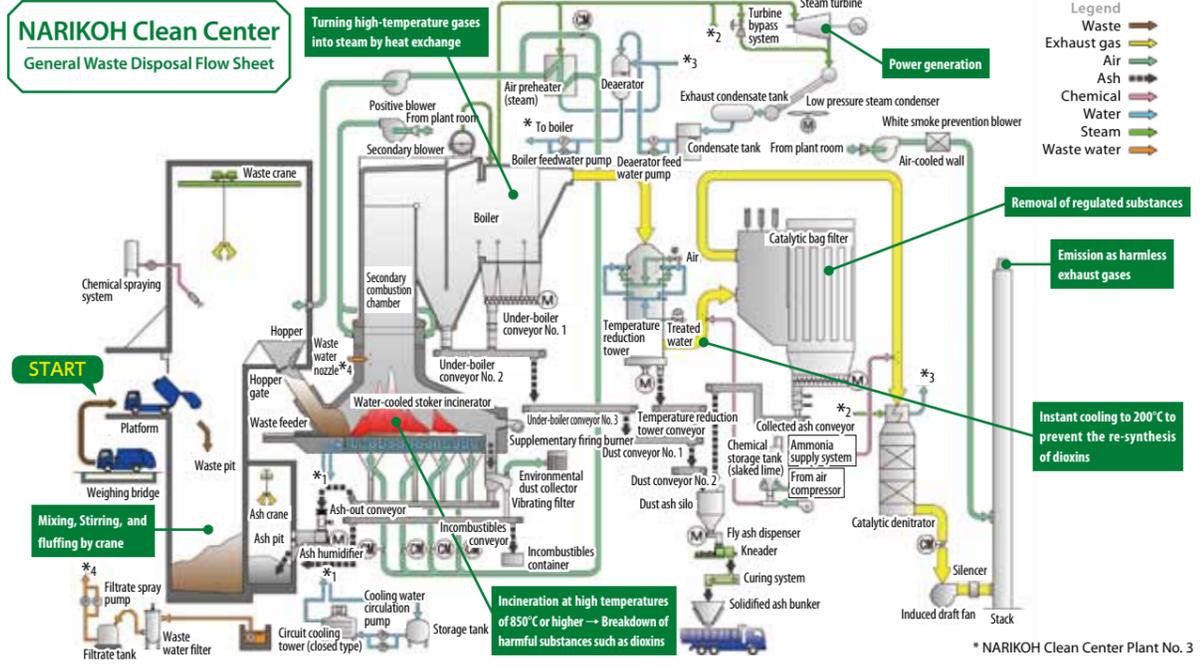


Stirring general waste with a crane to facilitate combustion



In the central control room, the state of the facility is constantly checked with multiple monitors.

### NARIKOH Clean Center General Waste Disposal Flow Sheet



## Compost Made from Pure "Kitchen Waste" Popular for Growing Crops

In addition to thermal recycling, Narita International Airport runs an initiative to make **compost** out of kitchen waste. With the cooperation of airport restaurants and the NAA staff cafeteria, we collect **pure "kitchen waste"** separately from ordinary waste.

When kitchen waste is brought to NARIKOH Clean Center, it is placed in a special machine that agitates it for three hours with sawdust and fermentation bacteria. It is then transferred to a fermenting tank where it undergoes fermentation at 60°C. After maturing for three months in a maturing tank, **the compost has a fine texture**. In fiscal 2017, we produced approximately three tons of compost from 14 tons of kitchen waste. Besides being used at greening projects both inside and outside the airport, this compost is given out for free in dedicated bags to local residents and at airport events, and receives excellent reviews as a great fertilizer.



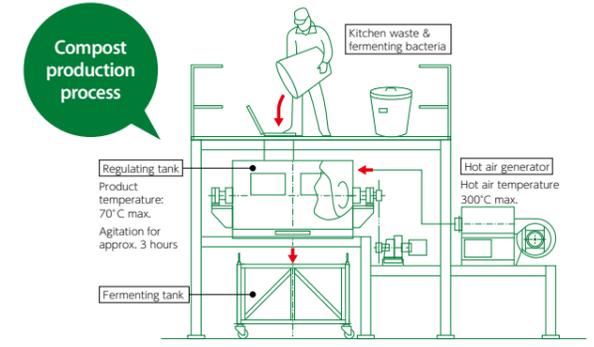
Kitchen waste is inserted from the top of this machine where it is fermented for three hours.



Finished compost. It is finely textured and easy to use.



Compost in a special bag



### Voices from NARIKOH Clean Center



From the left: Naoaki Koike, Technical Advisor; Kunihiko Tsubaki, Operating Officer; Yoshinori Sekiguchi, Manager

### Keeping Narita International Airport Clean While Promoting Efficient Recycling

NARIKOH Co., Ltd.

**Clean Center**      **Kunihiko Tsubaki, Operating Officer**  
**Naoaki Koike, Technical Advisor**  
**Yoshinori Sekiguchi, Manager**

NARIKOH Clean Center was founded in 1969, and we began incinerating waste when Narita International Airport opened in 1978. Currently, as a member of the Narita International Airport Eco-Airport Development and Planning Council, we attend Council meetings twice a year. We exchange opinions with the various departments in charge, aiming for an even more environmentally friendly waste disposal facility.

At present, we have three plants, and we run three general waste incinerators, two at Plant No. 1, and one at Plant No. 3. Plant No. 2 processes industrial waste and industrial waste subject to special control. Plant No. 3, which is equipped for thermal recycling power generation, can incinerate 90 tons of general waste a day. Currently, approximately 70 tons of waste generated by the airport daily is incinerated at Plant No. 3. In the past, power generation was difficult unless using a large 100-ton class furnace, but in recent years, technology that allows stable power generation even with small

furnaces of about 90 tons has been established. Thus, looking to the future global environment, we set up a power generation facility at Plant No. 3 and began thermal recycling.

Securing final disposal sites for waste has become difficult in recent years. So we thought that incinerating waste to reduce its volume and weight would be an effective way to extend the use of existing waste disposal sites. At the Clean Center, in addition to practicing safe incineration, we use the highly calorific waste discharged daily from the airport as a source of thermal energy. We believe thermal recycling power generation utilizing this heat is also effective to reduce our greenhouse gas emissions.

Since further airport expansion is under consideration, the amount of general waste is expected to increase as well. While considering the construction of a new facility, we are going to promote recycling to reduce general waste and keep the Airport clean.