Overview of Facilities

Name	Machida City Bio-Energy Center
Address	3160 Shimo-Oyamada-machi, Machida, Tokyo
Site area	Approx. 77,000 m²
Total floor area	Plant building: Approx. 17,000 m² Administrative building: Approx. 6,100 m²
Floors/Height	Plant building: 2 basement floors; 5 aboveground floors; about 28 meters in height Stack height: 100 meters Administrative building: 4 aboveground floors; about 20 meters in height
Capacity of facilities	Heat recovery facility (incinerator) Stoker-type incinerator: 258 t/day (129 t/day × 2 incinerators) Biogasification facility: 50 t/day high-temperature dry methane fermentation Incombustible/bulky waste treatment facility: machine-sorting plus hand-sorting 47 t/5 hours
Design/Construction	Takuma Co., Ltd.
Design/Supervision	Nikken Sekkei Ltd.
Plant technology support	Japan Waste Management Association
Management company	Machida High Trust Co., Ltd.

Access » Take bus from the Machida Bus Center to the Municipal Indoor Pool.
Take either:
Bus headed for the Municipal Indoor Pool(Machi Route 38) <or>
Bus headed for Nozuta Shako via the Municipal Indoor Pool(Machi Route 39)

Machida City Bio-Energy Center
Tel: 042-722-3111 (representative)
Open all year round 7:00 a.m. to 7:00 p.m.

Machida City website https://www.city.machida.tokyo.jp/shisei/shiyakusyo/kankyo01.html
Machida City Bio-Energy Center website (Managing company website) http://machidashi-bioenergycenter.com/

Note: “Bio-Energy” is a term used to denote energy made from biomass.

MBEC

Machida City Bio-Energy Center

MACHIDA City

A bio-energy center that processes municipal waste using dry methane fermentation—the first in the Tokyo area and a leading facility for the world

Basic Approach

The basic approach followed by Machida's citizens, business enterprises, and administrative authorities is to not produce, incinerate or landfill waste. By rigorously reducing waste and recycling resources, the city aims to be sustainable and have low impact on the environment.

Basic Policy

1. Strengthen ties with citizens and business enterprises, and pursue efforts with their cooperation.
2. Work to reduce general waste.
3. Work to reduce business waste.
4. Establish eco-friendly facilities to recycle resources and work to process waste properly and safely.
5. Strengthen response to societal issues.

Facility-Set Standards

	Self-imposed Standards	Regulatory Standards
Particulate matter	0.005 g/m^3_N	0.04 g/m^3_N
Sulfur oxides	10 ppm	580 ppm
Hydrogen chloride	10 ppm	430 ppm
Nitrogen oxides	30 ppm	250 ppm
Mercury	0.03 mg/m^3_N	0.03 mg/m^3_N
Dioxins	0.01 ng-TEQ/m^3_N	0.1 ng-TEQ/m^3_N

Note 1: All values displayed in the table are dry gas and reflect values equivalent to 12% oxygen.
Note 2: Numerical values are mean values per hour. Note 3: Dioxins reflect periodically measured values.

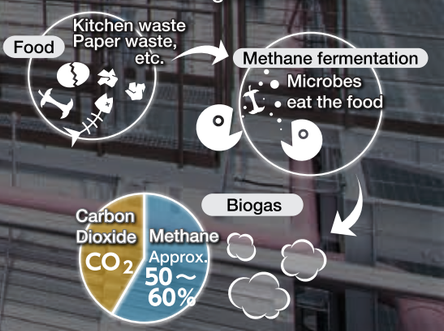
The city of Machida wants to protect the local and global environment, so we follow the basic principle of trying not to produce, burn, or landfill waste. One recommended way to reduce kitchen waste is to process it at home using a composting bin or food waste disposer. A biogasification facility was built to turn excess kitchen waste into a resource.

1

What is biogas?

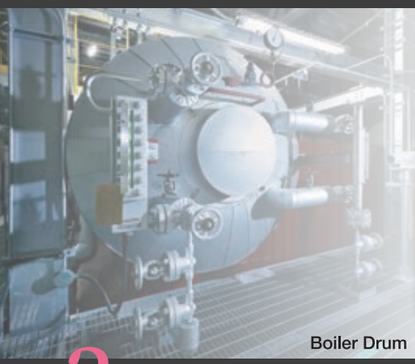
Biogas is a gas generated through fermentation, when microbes feed on food waste and other organic matter. The gas contains methane, which is highly flammable and can be burned to supply energy in the form of heat or power. The recovery of biogas is an effective way to utilize waste that reduces emissions of carbon dioxide, a leading cause of global warming.

Flow of biogasification



2

1. Facilities Developed for a Good Residential Living Environment



Boiler Drum

State-of-the-art plant technologies enable adherence to strict environmental standards. In addition, the excess heat from burning garbage and high-efficiency power that is generated from the biogas obtained from fermenting waste help reduce greenhouse gases.

Biogas Generator

Steam Turbine Generator

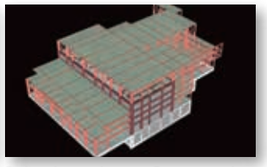
Power output
Steam turbines generator:
6,220 kW
Biogas generator:
250 kW × 4 units (1 reserve)

2. Highly Disaster-Proofed Facilities Give Citizens Peace of Mind

Emergency Power Generator

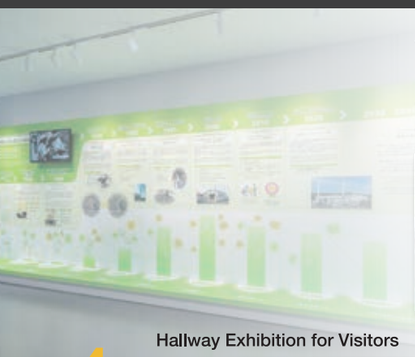
The highly disaster-proofed facilities can also serve an effective disaster mitigation role in times of emergency. Even if a natural disaster occurs, the facilities are designed to safely suspend operations, and after safe conditions are restored, to relaunch operations using an emergency generator for the quick resumption of waste processing and power generation.

Kamado Bench



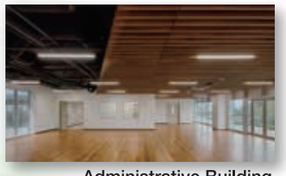
Seismic-resistant Construction

3. Facilities that Encourage Residents to Learn, Play and Grow



Hallway Exhibition for Visitors

Various environmental learning opportunities, such as workshops, are held for residents and visitors to expand connections within the community. Also, the administrative building and outdoor property are spaces where residents can gather and relax, which promotes further citizen interaction.



Administrative Building 2F Entrance Hall

Training room/Audiovisual room

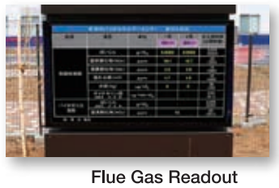
Gate Park

4. Stable Operation to Allow Residents to Lead Safe Lives

Central Control Room

The facilities can easily be monitored to ensure safe living for residents. Information about all operations is made available to the public. Also, the facilities are run to foster among local residents a sense of familiarity with the center.

Inspection



Flue Gas Readout

Facilities that blend in with the surroundings

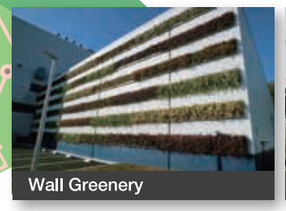
From the curved roof to the glass curtain wall, the administrative building greets visitors with an advanced, open design.
There are greenery on the walls everywhere and on the roof that produces a balanced harmony with the natural surroundings. The outdoor part of the property offers a footpath for strolling around.

Facilities for people to gather, fostering local familiarity

The property features Gate Park at the main entrance plus three terraces that are all open to the public. Gate Terrace intersects Green Walk and creates a space that residents can use at the entrance to the administrative building for gathering, meeting, and relaxing in.

Rooftop Greenery

Ecovoid



Wall Greenery

Sky Terrace

Rental Rooms

Rental rooms are available for residents to use for meetings and events, supporting active local activities.

Meeting rooms 1–5 | Multipurpose rooms (w/kitchen) 1–2 | Japanese-style room

Japanese-style Room

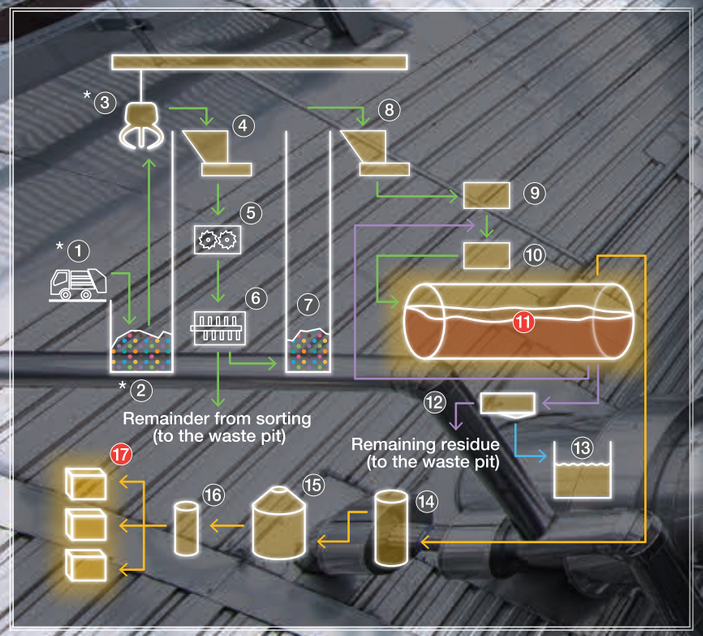
Multipurpose Rooms (w/kitchen)

About Facility Tours

Facility tours are run to help citizens learn about the history of garbage processing in the city of Machida and the processes that take place at these facilities.
Note: Reservations are required for tours.

Flow of Waste Disposal -Biogasification Facility-

Organic waste is sorted out from the burnable garbage and processed by fermentation—microbial action that produces biogas. The recovered biogas is then used to generate power.



*①&②&③ are shared with the heat recovery facility

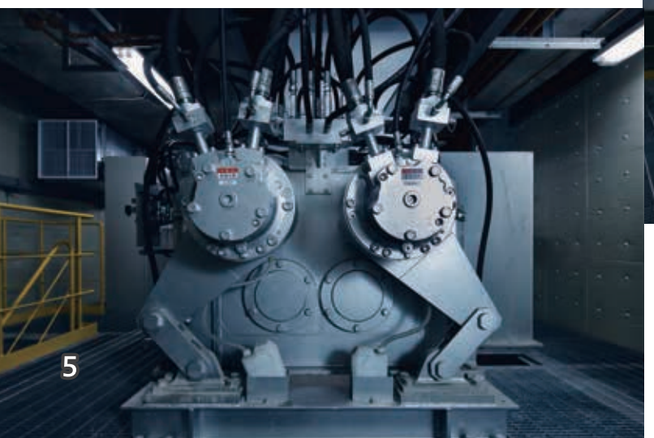
① Platform
② Waste pit
③ Waste crane
④ Waste hopper for sorting/crushing
⑤ Crusher
⑥ Sorter/Crusher
⑦ Food waste pit
⑧ Biogasification waste hopper
⑨ Thermal refining unit
⑩ Substrate heat exchanger
⑪ Fermentation Tank
⑫ Dehydrator
⑬ Recovered water processing equipment
⑭ Desulfurization equipment
⑮ Gas retention equipment
⑯ Equipment to remove trace toxins
⑰ Biogas Generator
→ Flow of garbage
→ Flow of biogas
→ Flow of the remaining residue
→ Flow of recovered water

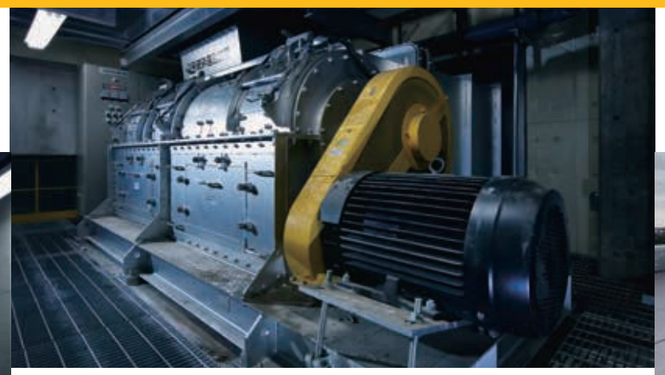
Fermentation Tank

The crushed and sorted waste is sent to the fermentation tank where it is fermented by microbes to produce biogas.

Crusher

Crushes burnable garbage to a uniform size to increase the processing efficiency of the sorter/crusher in the next stage.





Sorter/Crusher

Finely crushes the received burnable garbage and extracts the food waste or other waste suitable for methane fermentation.

Gas Retention Equipment

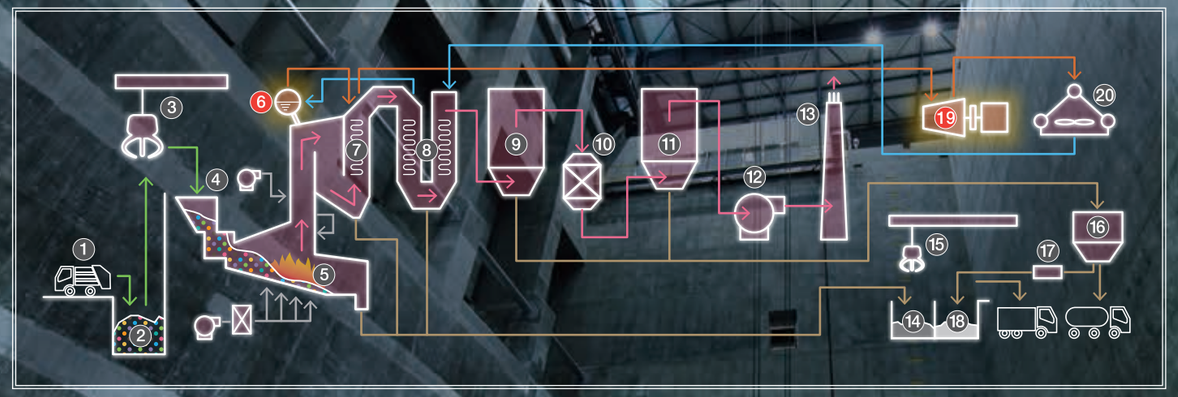
After the biogas has the impurities removed, it is stored temporarily then sent to a biogas generator.

Biogas Generator

The biogas fuels a biogas engine, which spins a generator to produce electricity. Also, the heat that is generated in the process of generating power is also used efficiently.

Flow of Waste Disposal -Heat Recovery Facility-

Garbage is incinerated, reduced and detoxified. The flue gas produced during incineration is processed thoroughly to prevent air pollution and only then is released into the air. Also, the heat energy produced during incineration is used to generate power.



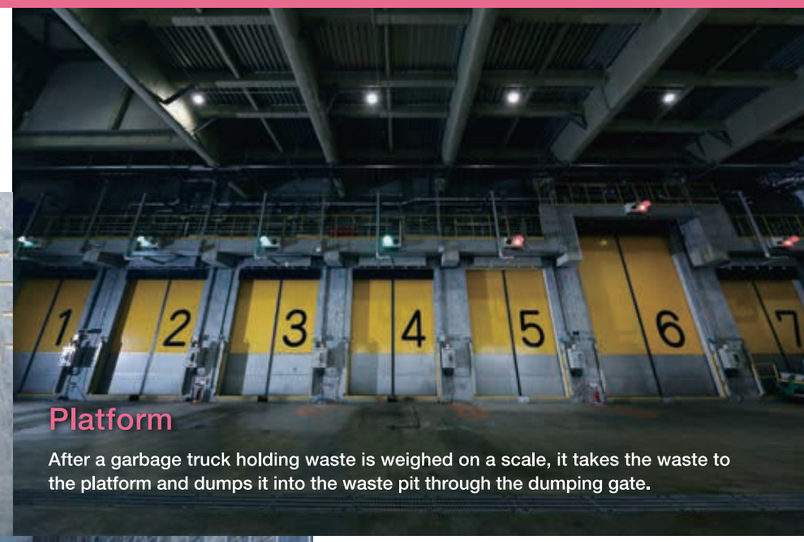
① Platform
② Waste pit
③ Waste crane
④ Waste feed hopper
⑤ Incinerator
⑥ Boiler Drum
⑦ Superheater
⑧ Economizer
⑨ No. 1 Bag filter
⑩ SCR* Reactor (* Selective Catalytic Reduction)
⑪ No. 2 Bag filter
⑫ Induced Draft Fan
⑬ Stack
⑭ Ash pit
⑮ Ash crane
⑯ Fly ash storage tank
⑰ Kneader
⑱ Treated fly ash pit
⑲ Steam Turbine Generator
⑳ Air cooled condenser

→ Flow of waste
→ Flow of air
→ Flow of flue gas
→ Flow of condensate
→ Flow of steam
→ Flow of ash

Waste Processing Equipment

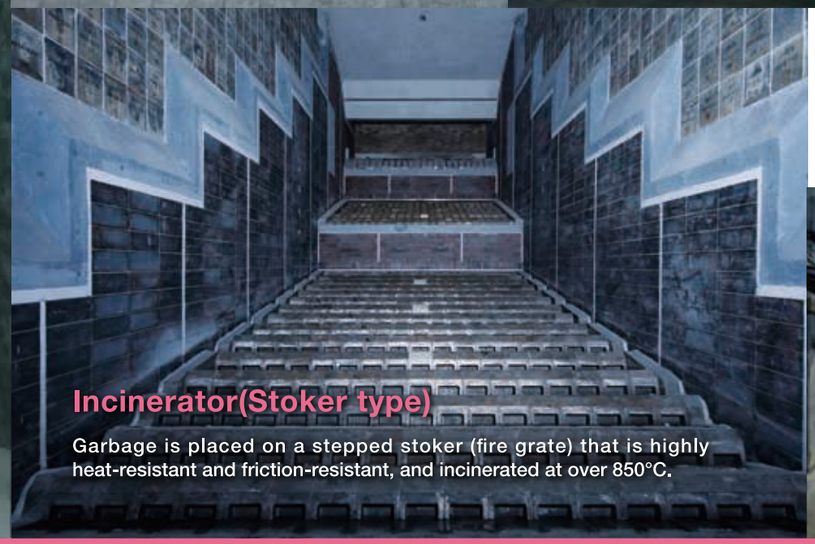
Waste Pit / Waste Crane

Seven days of waste can be stored up. To ensure consistent incineration, a huge crane picks up two tons of waste at a time to mix it all up and even it out.



Platform

After a garbage truck holding waste is weighed on a scale, it takes the waste to the platform and dumps it into the waste pit through the dumping gate.



Incinerator(Stoker type)

Garbage is placed on a stepped stoker (fire grate) that is highly heat-resistant and friction-resistant, and incinerated at over 850°C.

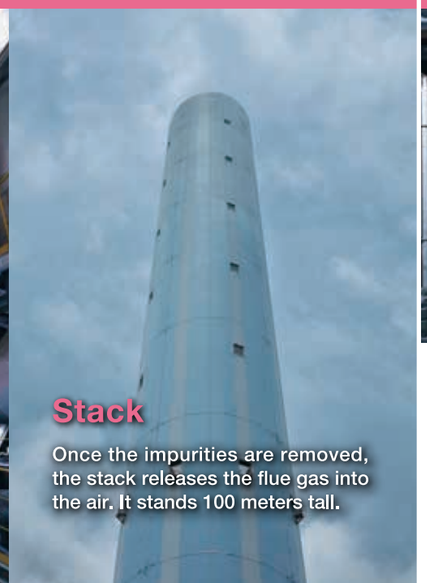
Ash Pit

This pit is used to accumulate the ash generated by incineration. The ash is later sent to an eco-cement manufacturing facility.

Flue Gas Processing Equipment

Bag Filter

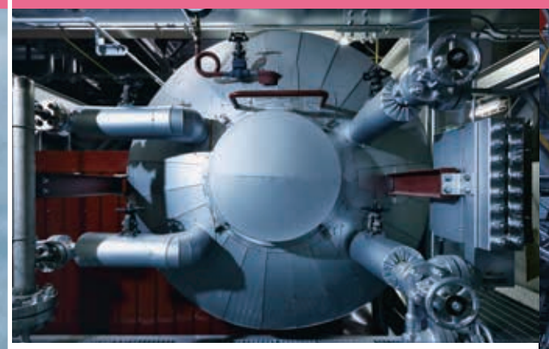
Two bag filters that employ a filter cloth remove even the finest particles of ash down to one micron in size.



Stack

Once the impurities are removed, the stack releases the flue gas into the air. It stands 100 meters tall.

Heat Recovery Equipment



Boiler Drum

The flue gas coming out of the incinerator heats water and turns it into steam. That steam is heated and pressurized in a superheater to 5 MPa and 420°C and sent to a steam turbine.

Economizer

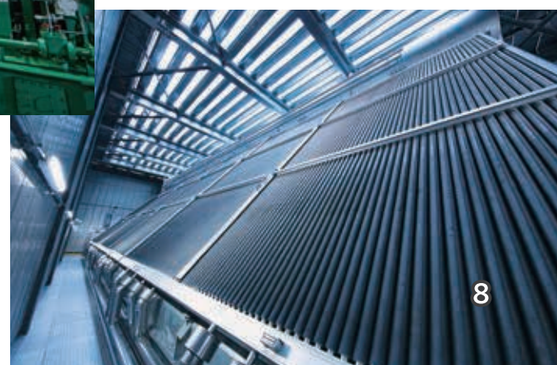
Heat is removed from the flue gas and the water sent to the boiler drum is heated, lowering the flue gas temperature.

Steam Turbine Generator

The force of steam is used to generate power by rotating steam turbines in the generator that has a rated power output of 6,220 kW. Also, some of the steam is sent to the Machida Municipal Indoor Pool and other facilities.

Air Cooled Condenser

Cools the steam used to generate power back into water. This water is then re-used by sending it to the boiler.

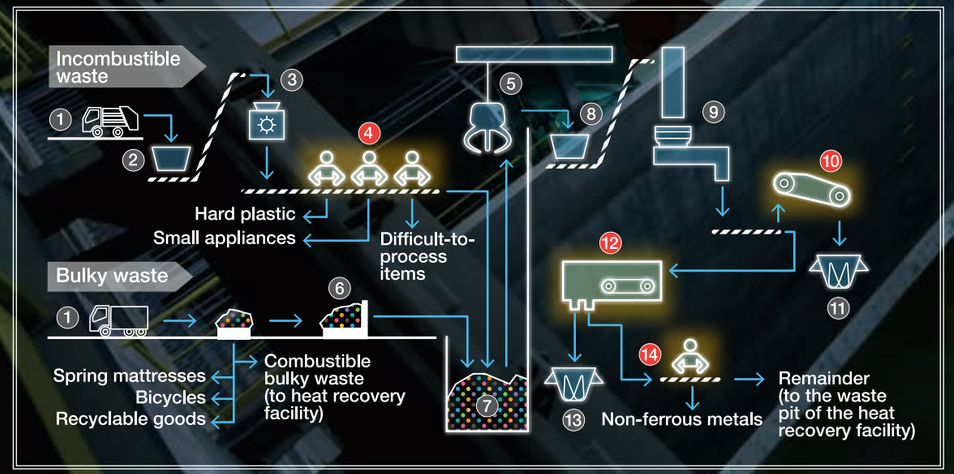


Flow of Waste Disposal

-Incombustible/Bulky Waste Treatment Facility-

Resources from non-burnable garbage and bulky waste are sorted by hand and machine for recycling.

① Platform (Incombustible/bulky waste)
② Incombustible waste receiving hopper
③ Incombustible waste bag-breaking machine
④ Hand-sorting Conveyor for Non-burnable Waste
⑤ Incombustible/ bulky waste crane
⑥ Receiving yard
⑦ Incombustible/ bulky waste pit
⑧ Incombustible/ bulky waste receiving hopper
⑨ High-speed gyratory crusher
⑩ Magnetic Sorter
⑪ Steel storage hopper
⑫ Aluminum Sorter
⑬ Aluminum storage hopper
⑭ Remainder Conveyor
→ Flow of garbage and resources



Incombustible/Bulky Waste Pit

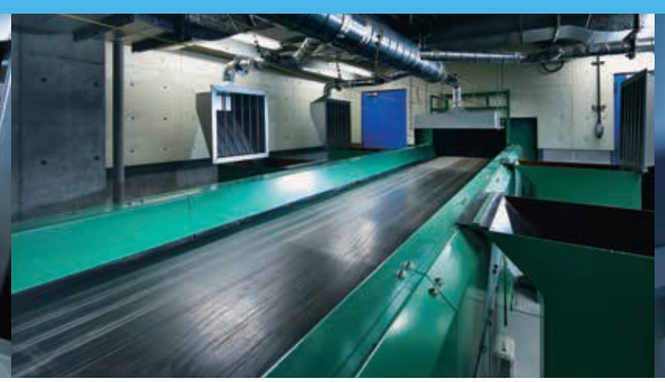
Sorted incombustible/bulky waste is dumped into the waste pit. It is then lifted into the waste receiving hopper and put through the high-speed gyratory crusher.

High-speed Gyratory Crusher

Reduces waste to a uniform length of 15 cm or less on one side. By doing so, metals and other resources can easily be sorted out.

Incombustible Waste Bag-breaking Machine

Breaks open garbage bags for sending to the hand-sorting conveyor at the next stage.



Hand-sorting Conveyor for Non-burnable Waste

Hard plastic, small appliances and other items are sorted out by hand for recycling as resources.

Magnetic Sorter

Ferrous metals in crushed incombustible waste stick to the magnet and are removed.

Aluminum Sorter

When aluminum gets close to a powerful, fast-spinning magnet, a repulsive force is generated. Aluminum is removed using this force in combination with a forward-moving conveyor.