

Waste to Energy Technologies in Japan

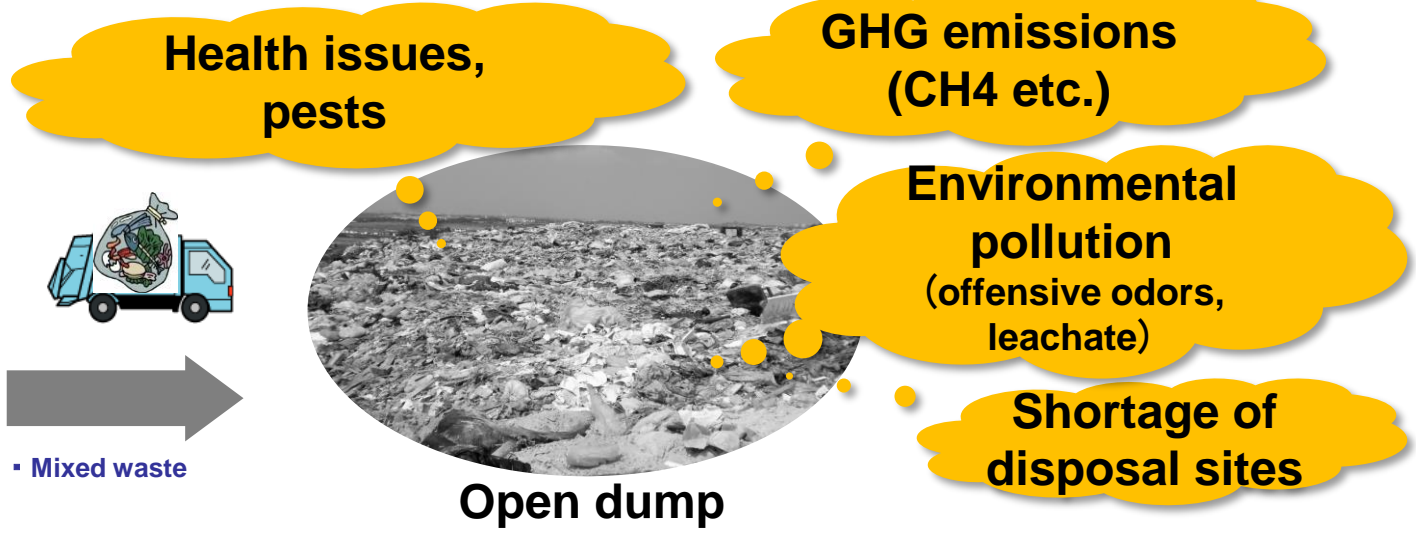
August 26th 2019

Japan Environmental Facilities Manufacturers Association
(JEFMA)

Waste incineration widely used in Japan today

Past

Mixed collection



▪ Mixed waste

Open dump

Now

Separate collection



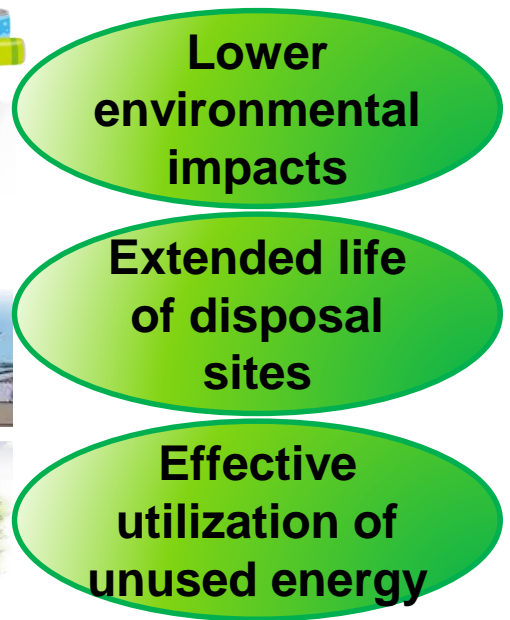
▪ Bulky waste
▪ Non combustible waste
▪ Recyclable resources

▪ Combustible waste

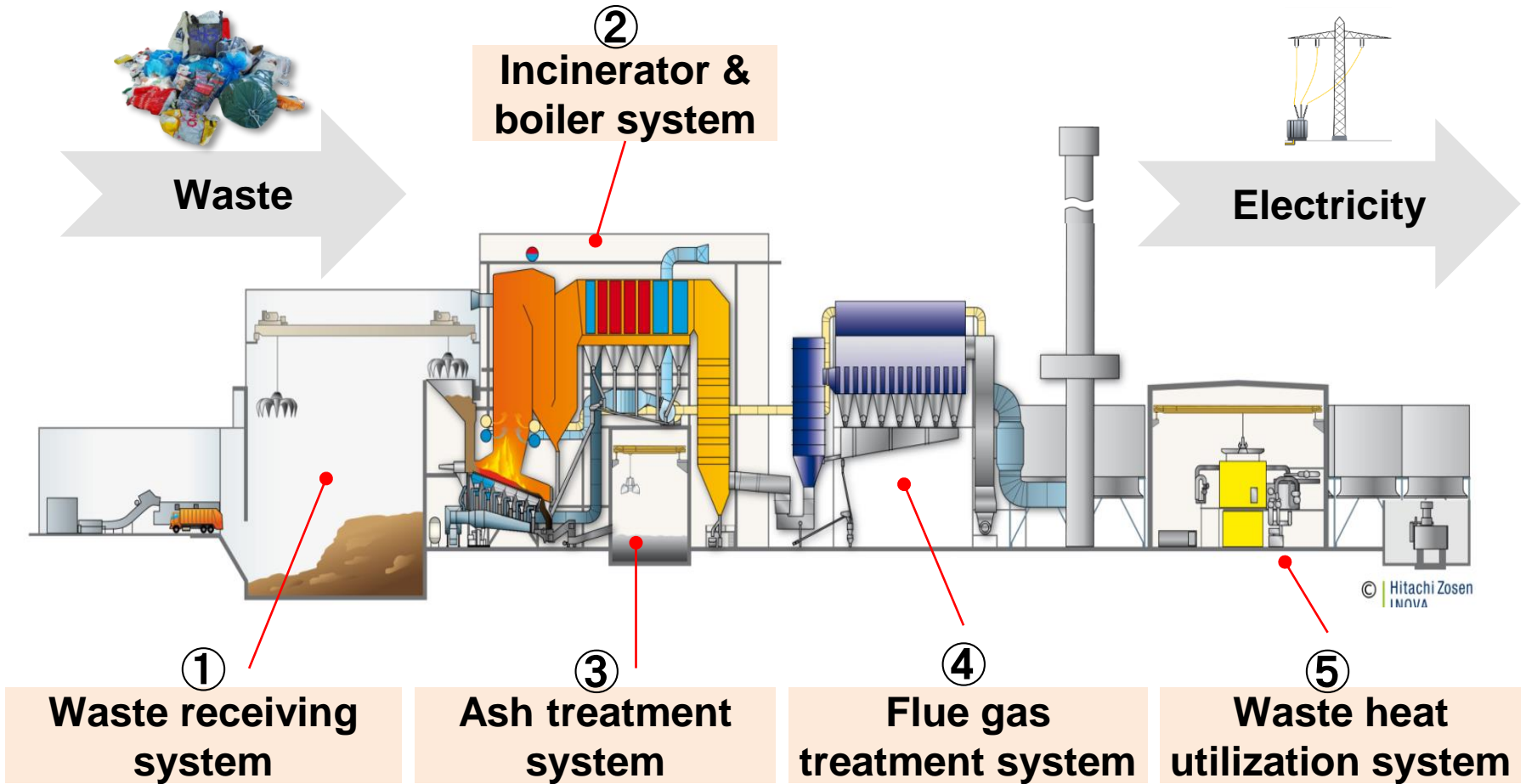
Material recovery facilities

Waste incineration facilities

Ash



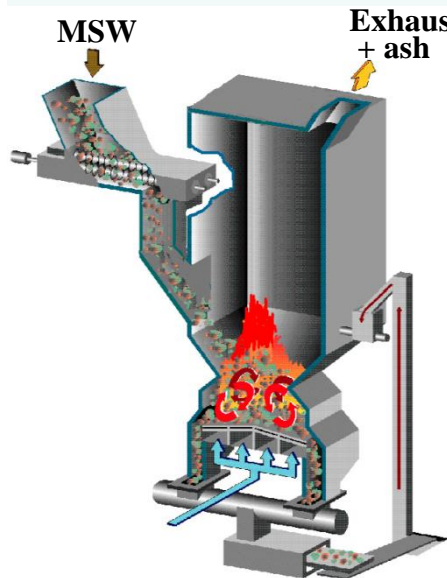
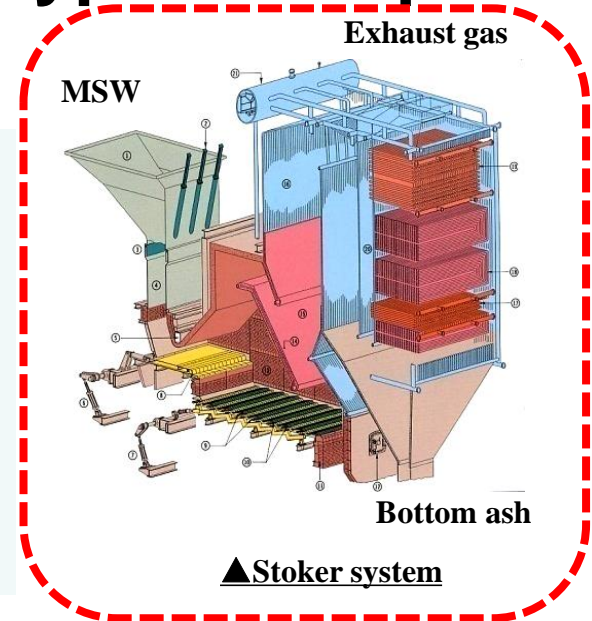
General design of a Waste-to-Energy plant



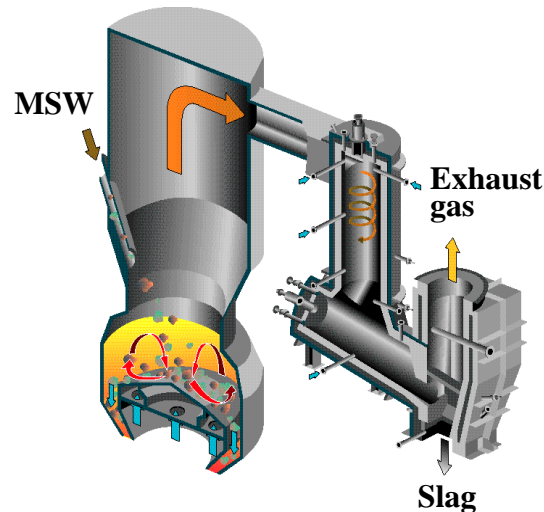
Four major incineration furnace types in Japan

The most proven technology

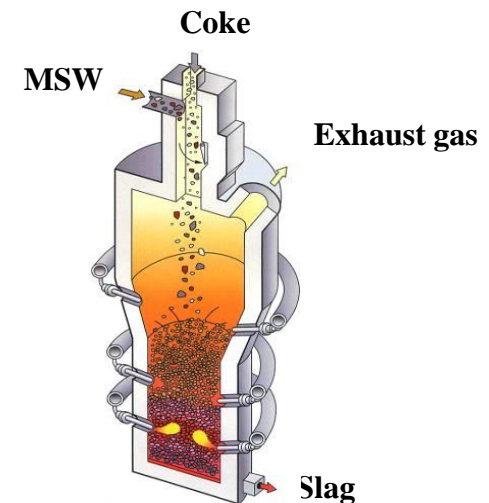
- **Stoker system (grate)**
- **Fluidized bed system**
- **Gasification and melting system**
- **Direct melting system**



▲ Fluidized bed system



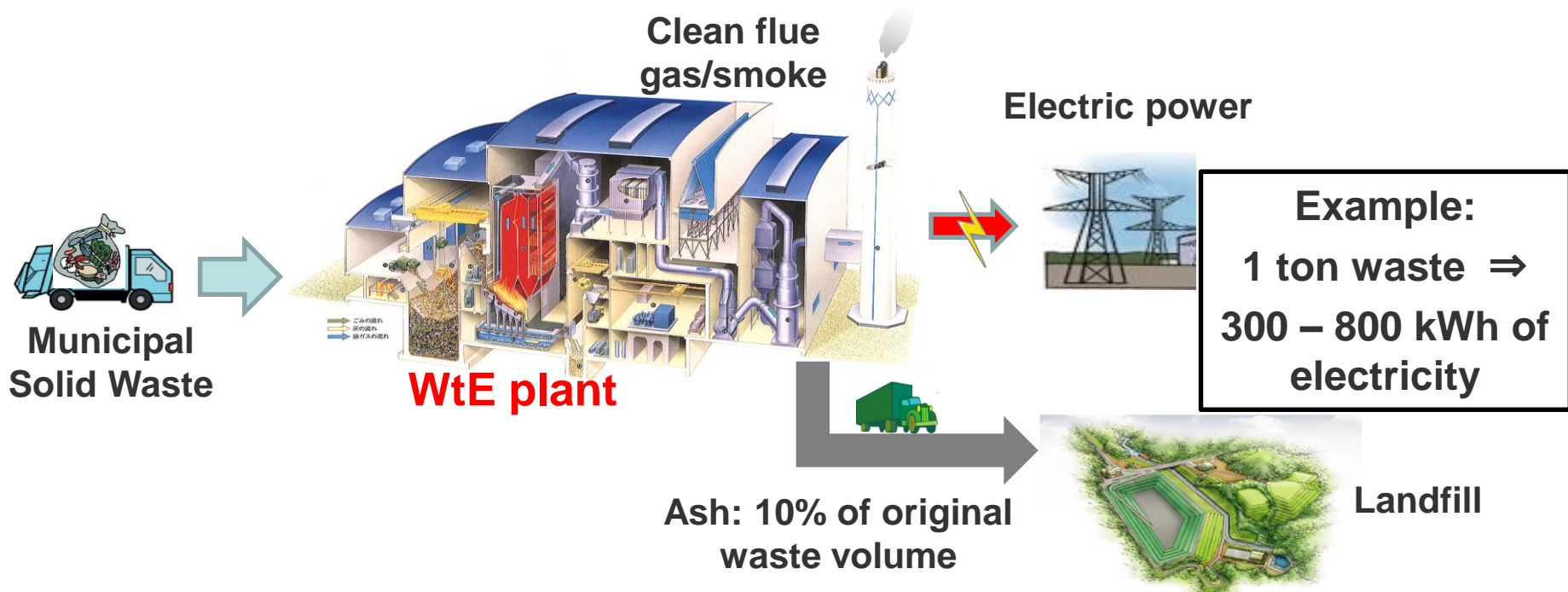
▲ Gasification and melting system



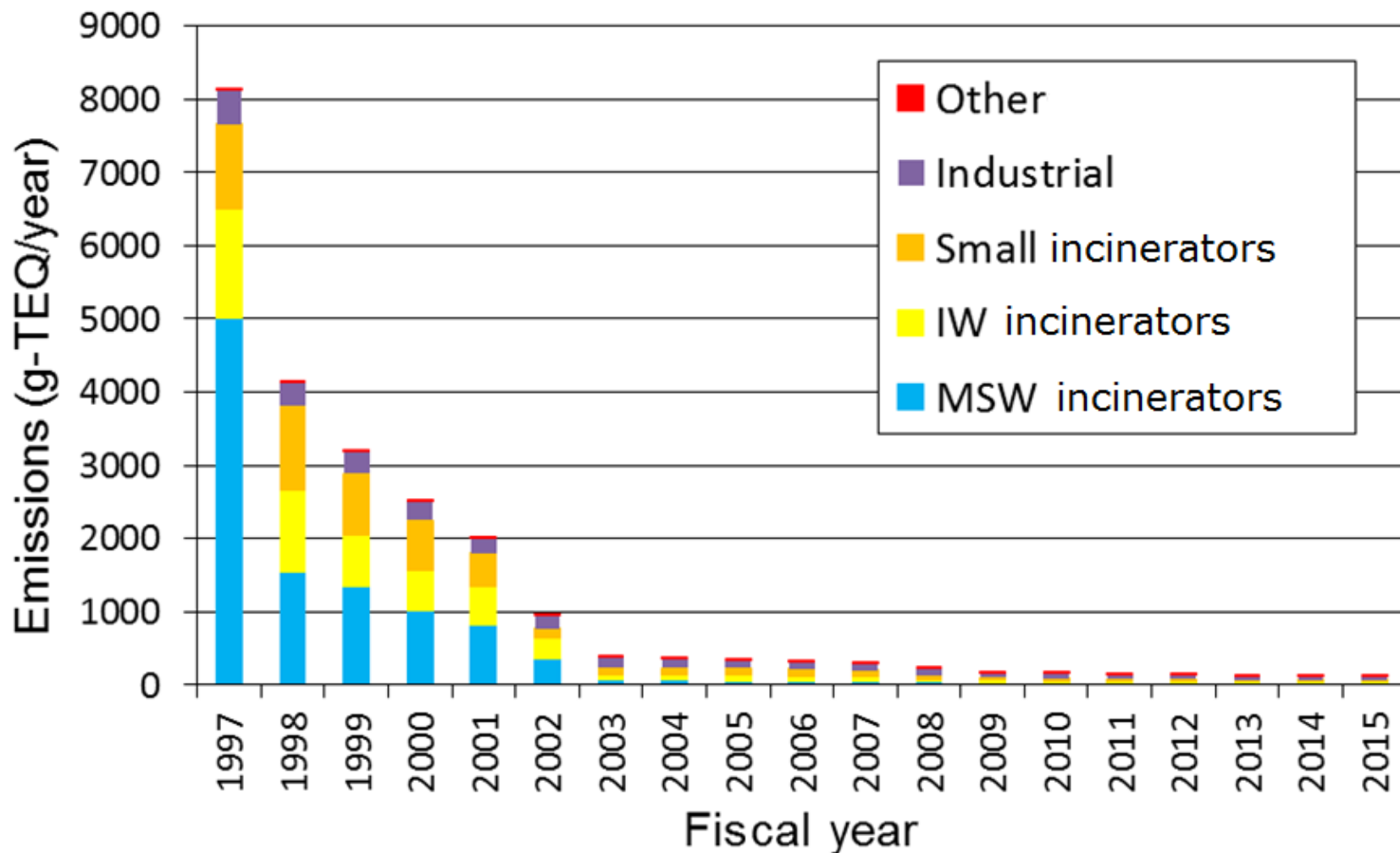
▲ Direct melting system

Features of Waste-to-Energy technologies in Japan

- ❑ Proven and reliable. Decades of experience with operation and maintenance – both waste incineration and energy recovery.
- ❑ Can almost perfectly incinerate waste. Reduces volume by 90% and provides sanitary disposal of ash.
- ❑ State-of-the-art flue gas treatment. Systems meet stringent emission standards and minimize environmental impacts.



Dioxin emissions in Japan



Benefits of regular maintenance and upgrades

(Case study of maintenance, upgrades, monitoring)

□ Data for MSW incinerator with power generation (3.4 MW)

- Start-up 1994
- Type of incinerator Grate type (Stoker system)
- Throughput 150 ton/day, 2 lines
- Flue gas treatment system Bag Filter + Selective Catalytic Reactor

□ Results of flue gas analysis

Item	Units	Maximum permitted	At start-up		After 11 years		After 20 years	
			Line 1	Line 2	Line 1	Line 2	Line 1	Line 2
Dust	g/m ³ _N	< 0.01	0.001	0.001	< 0.001	< 0.001	0.0012	0.0011
SOx	ppm	< 30	22	13	9	8	8	13
HCL	ppm	< 30	9	10	10	11	9.4	13
NOx	ppm	< 60	40	35	46	44	53	53
CO	ppm	< 50	14	14	4	8	<7	<8
DXNs	ng-TEQ/m ³ _N	< 0.1	0.01	0.06	0.035	0.019	0.0055	0.0056

In summary...

- ❑ Japan chose incineration as a MSW management method from the viewpoint of sanitary treatment and volume reduction of MSW.
- ❑ We have developed incineration technology for many years. Incineration technology is mature and exhaust gas can be treated to a very high degree.
- ❑ The incineration facility can maintain its performance for a long time by proper maintenance.
- ❑ Incineration can treat sanitarily a large amount of MSW for a long period of time. Incineration is an effective method in urban areas where securing a landfill site is difficult.