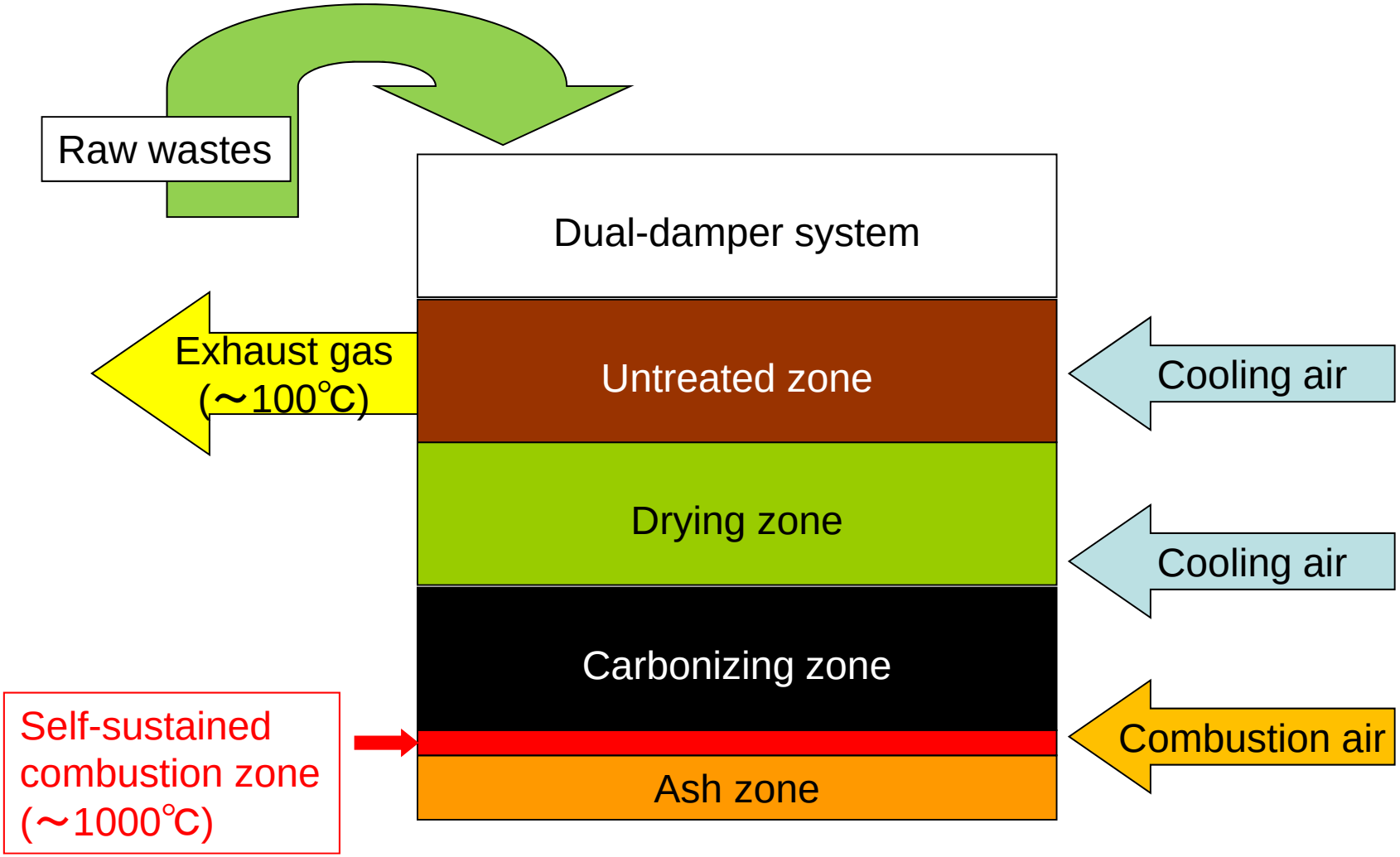
Introduction of ERCM
(Earth Resource Ceramic Machine)

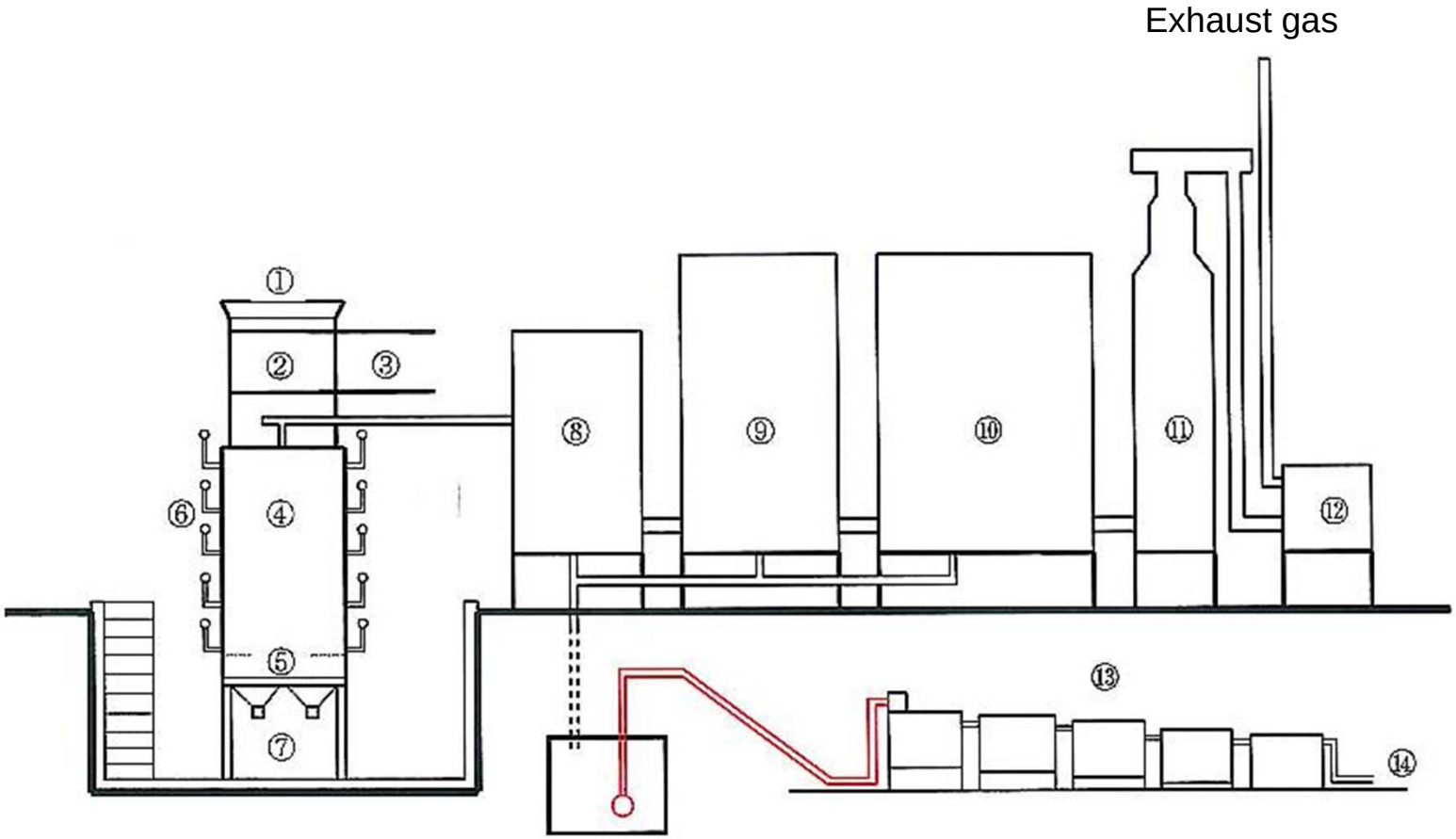
Operating principle of ERCM



What is ERCM ?

- **『ERCM is a reactor in which any kind of burnable wastes are thermally decomposed and changed into ceramic-like ash material』**
- Wastes are supplied two or three times per day through the dual-damper system
- Burnable wastes are dried, carbonized and combusted in the reactor without any pretreatments.
- Cooling air rapidly cools the exhaust gas and quenches the thermal decomposition reaction.
- Very narrow self-sustained combustion zone is well heated up to 1000℃, while the rest of the reactor are under the temperature around 100℃.

Process Flow of ERCM



① Waste supply
② Dual-damper
③ Damper driver
④ Reactor
⑤ Ash
⑥ Air inlet
⑦ Ash recovery
⑧ Exhaust gas cooler
⑨ Exhaust gas scrubber
⑩ Exhaust gas holder
⑪ Activated carbon （activated carbon, charcoal, zeolite）
⑫ Catalytic oxidizer
⑬ Condensed water filter
⑭ Sewage discharge

Merit of ERCM

- No pre-segregation of wastes is required and inert material such as metals and glasses can easily be recovered from the ash material.
- High moisture content wastes can be directly treated. Even the sludge cake with 80% moisture content can be thermally decomposed without pre-dyring and auxiliary fuels.
- Ceramic-like ash material coming out from ERCM contains no residual carbon and can be recycled without any additional treatments.
- Low emissions.
- Low costs (capital, running and maintenance).

Low emissions of ERCM

- Dioxins

  High temperature thermal decomposition and in-furnace rapid air cooling prevent dioxin formation

- HCl

  The inorganic chlorine will not become HCl due to low temperature in the furnace and some part of the organic chlorine will become inorganic chlorine due to the reaction with alkaline contents in the wastes and other part will become HCl which will dissolve in the condensed water at the exit of the furnace

- NOx

  Reducing atmosphere in the thermal decomposition zone and the quenching of the NOx formation reaction by the rapid air-cooling will prevent NOx formation

- Dust

  A slow air velocity and the filtering effect of the packed wastes will prevent dust emission

Low cost of ERCM

- Low capital cost
  - Exhaust gas treatment can be much simplified and bag filters are not required
  - There is no refractory required due to low temperature in the furnace and the material to be used for manufacturing ERCM is only carbon steel
- Low running cost
  - No auxiliary fuels are required
  - Electric power consumption is very low
  - There is no water usage
  - There are no chemicals required for exhaust gas treatment except for the activated carbon for waste water treatment
  - The labor cost is low due to simple operation and unmanned operation in nights
- Low maintenance cost
  - Corrosion of the carbon steel vessel is low due to low temperature and low HCl emission
  - No refractory maintenance is required

Commercial Application of ERCM

15m^3 Commercial plant (5tons/day of MSW treatment for Kashima city, Japan)

Emission data (@O_2 12%)

Item	Measured value	Japanese Standard value
NOx (ppm)	45-65	300
HCl (mg/Nm^3)	32	700
Dust (mg/Nm^3)	4.4	150
Dioxins (ng-TEQ/Nm^3)	2.6	5

Commercial Application of ERCM

Municipal solid waste (MSW) before treatment

Residual ceramic (ash) material after treatment