

Sludge treatment

High-efficiency two-stage sludge incinerator

Next-generation sludge incinerator capable of simultaneously reducing energy consumption and GHG emissions

Sludge incinerators typically emit such greenhouse gases (GHGs) as CO₂ and N₂O, the latter of which is 310 times more potent than the former in terms of GHG effect. Accordingly, the reduction of GHG emissions from these facilities is a matter of importance.

Kobelco Eco-Solutions boasts a robust track record spanning more than 30 years as well as superior plant engineering capabilities. Drawing on these strengths, we have developed a high-efficiency two-stage sludge incinerator supported by next-generation technologies aimed at simultaneously reducing energy consumption and GHG emissions.



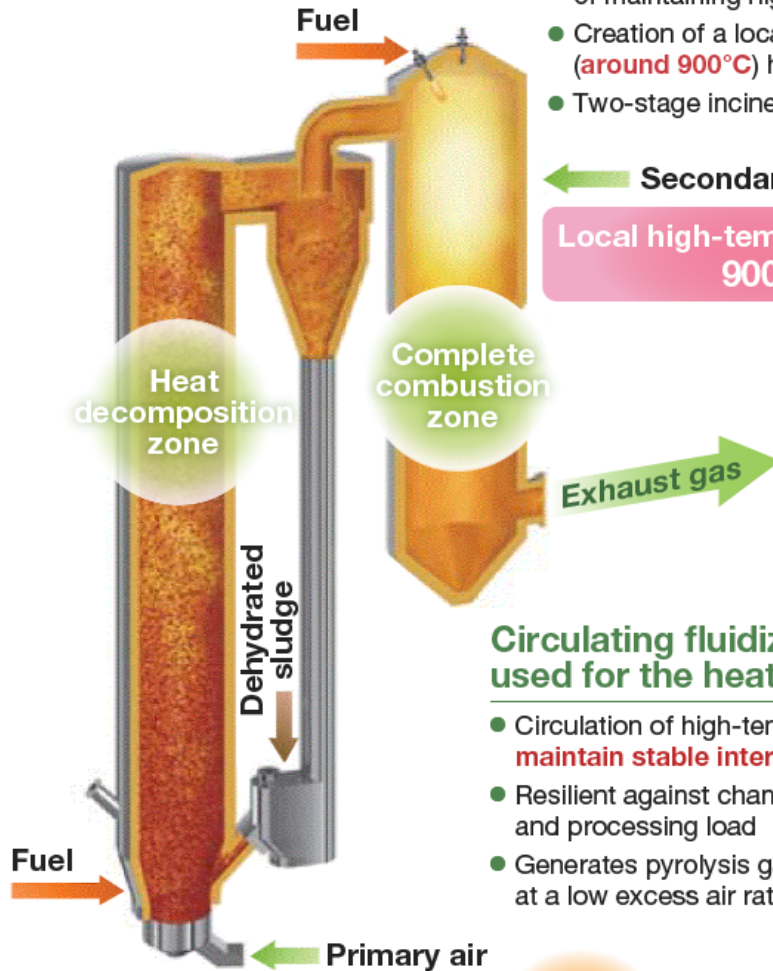
Features

- Employs fuel-efficient, two-stage sludge incineration process
- Reduces N₂O emissions by more than 50% (bubble-type) and more than 80% (circulation-type) compared with conventional, fluidized bubble-type and circulation incinerators
- Capable of simultaneously reducing energy consumption and GHG emissions

Mechanism overview

Combustion within the heat decomposition zone (stage 1) is sustained at a lower excess air ratio to maintain suppressed combustion that produces pyrolysis gas while curbing the volume of GHGs generated. The complete combustion zone (stage 2), on the other hand, is fed with an ample volume of air to fully incinerate the combustion gas. This results in the creation of a local high-temperature area and helps reduce the volume of CO₂ and N₂O emissions without an additional fuel supply.

Circulation type



Complete combustion zone (local high-temperature area)

- **More fuel efficient** than furnaces capable only of maintaining high interior temperatures
- Creation of a local high-temperature area (around **900°C**) helps **reduce N₂O**
- Two-stage incineration also helps **reduce N₂O**

Secondary air

Local high-temperature area
900°C

Exhaust gas

Circulating fluidization method used for the heat decomposition zone

- Circulation of high-temperature fluidized sand helps **maintain stable interior temperature**
- Resilient against changes in sludge characteristics and processing load
- Generates pyrolysis gas via suppressed combustion at a low excess air ratio

Excess
air ratio
Less than
1.0

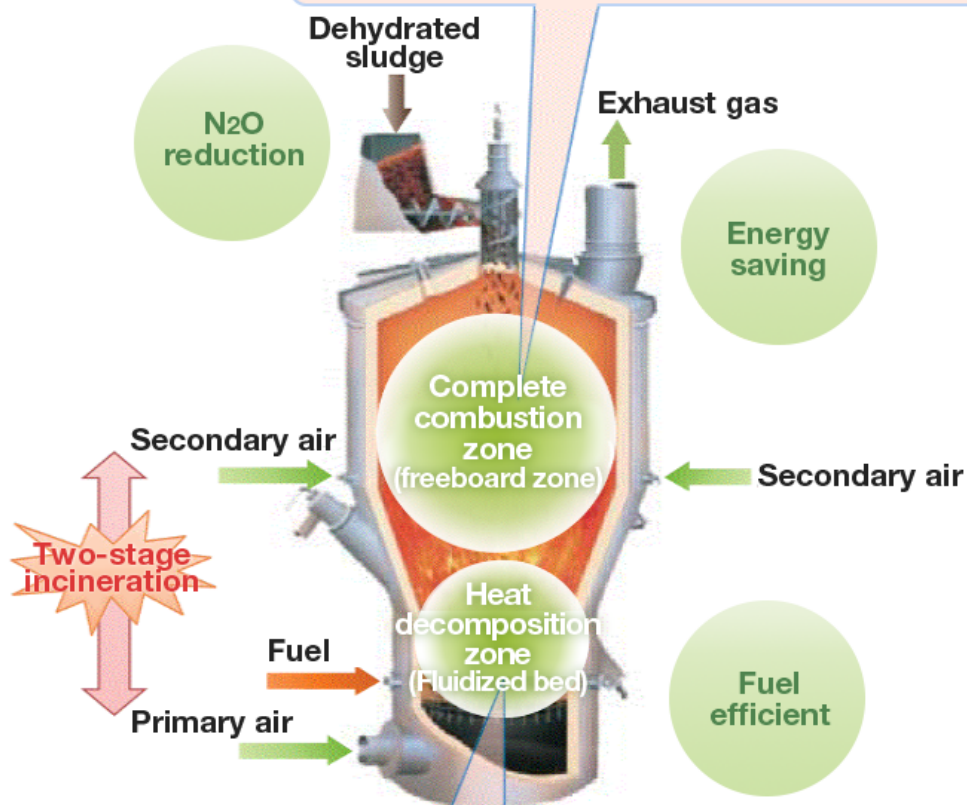
Highly reliable machinery composition

Rational machinery composition, that is the result of applying our proven existing technologies, supports safe operation

Bubble type

Complete combustion zone (freeboard zone)

- Completely incinerates combustion gas by maintaining appropriate temperature (850°C or more) and ensuring sufficient retention time (6 seconds or more)
- Decomposes CO and N₂O without additional fuel via the creation of a local high-temperature area fed by secondary air supply



Heat decomposition zone (fluidized bed)

- Suppressed combustion maintained at a low excess air ratio helps curb N₂O and NO_x generation (air dispersion plates installed on the bed help enhance the combustion ratio and maintain sand layer temperatures even with the lower excess air ratio of the primary air supply)
- Dehydration, heat decomposition and incineration of sludge instantly takes place after it is radically mixed with air from primary air supply on the fluidized bed
- Interior temperatures are kept high even after suspending operation thanks to superior heat retention property

System flows of the high-efficiency circulating two-stage furnace

