Treating Municipal Solid Waste by using Hydrothermal Technology

Daylight energy. inc

Overview

Waste is valuable material. However, if we don’t treat waste in the right manner, the waste will pollute our land, air, water and all other valuable environments.

The concept of this technology is Fuel producing. Using MSW, we will produce high quality solid fuel. Of course, at the same time, we will solve the waste problem as well.

We can produce the fuel, which will not become putrid and not occurring bad smell. Easy to storage for long term. Easy for handling. Calorific values will be low to middle grad coal.

Hydrothermal Treatment Reactor

1. What is Hydrothermal Treatment

Treating waste under subcritical condition
(1.8-2.5Mph, 180-230℃) and producing valuable product.

Macromolecule material reacts with high temperature･high pressure steam and disintegrate to low molecular. Organic matter in the material is quickly disintegrating and germ free useful output can be obtained.

Since “Water” is used for hydrolysis reaction, this treatment can suppress to occur dioxin and NOx

Macromolecule (R) + H2O
→ Low molecule (R) + OH^-+ Molecule (R3) +H^-

If a decomposition reaction progresses, it will be decomposed into the constitutional unit
EX. Protein→Peptide→Amino Acid,
Cellulose→Polysaccharides→Glucose

2. Merit of Hydrothermal Treatment machine

- From various types of waste, can produce solid fuel, fertilizer and other valuable product.

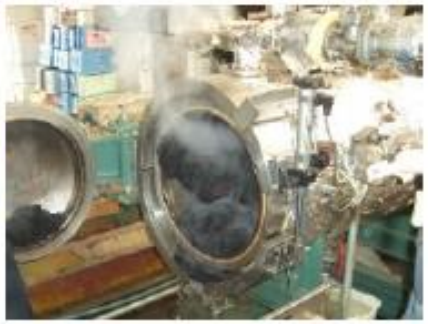
[Can use for various types of waste]
- ☐Municipal Solid Waste
- ☐Household garbage
- ☐Sludge
- ☐Animal droppings
- ☐etc

[Points]
- ☐Processing in a short time (1.5~3.5hours/ one process)
- ☐Product after treatment can use for high value solid fuel
- ☐Maintenance check and operation management are easy

Mixed food waste

Loading to the reactor

Product



30min treatment

3. Comparisons with incineration treatment

[Problem of Incineration]

1. Dioxin and other harmful substance may discharge to the air even removal equipments install in the plant.
2. Maintenance cost of facilities including removal equipments of toxic gases and sewage will become enormous.
3. Need great amount of fuel for incineration.
4. For treating high moisture content waste, the cost of incineration will rise more.
5. Proper disposal of incineration ash, which generate a large amount will become problematic.
6. Initial investment cost is very high.

[Positive points of Hydrothermal Treatment]

1. During treatment, dust and toxic gas do not occur.
2. In order to produce solid fuel from waste by using Hydrothermal Treatment technology, realizing a total recycling of waste.
3. No problem to treat high moisture content waste. Treatment cost is same as dry product.
4. Mixed organic waste, including plastic can treat together and can produce valuable solid fuel.
5. Initial cost, maintenance cost and operation cost are much lower than incinerators.
6. Because using fuel, which produced by waste, no need to buy fuel from outside.
7. Can generate electricity by using solid fuel, which produced by waste.

4. Analysis of Hydrothermal Product

[Before Treatment]
Organic: 77%
Paper: 7%
Plastic: 10%
Textile: 5%
Rubber: 1%
Total: 100%
※ Household garbage

Peretized product

[Product]
Moisture: 1.67%
Volatile Matter: 70.20%
Fixed Carbon: 14.44%
Ash: 13.69%
LHV: 4491Kcal/kg
HHV: 4921Kcal/kg
Total sulfur: 0.26%
C: 51.45%
H: 6.28%
O: 23.73%
N: 2.92%
Cl: 0.46%

According to Shinko's experiment

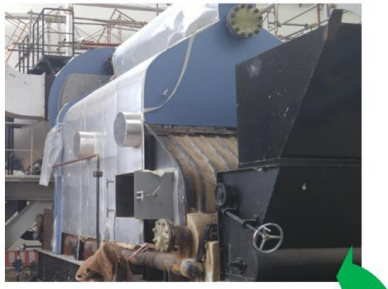
5. Flow of treatment

Collecting MSW

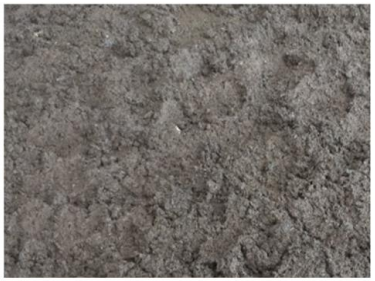
Loading to Hydrothermal Reactor

Hydrothermal Reactor: Treat MSW with high pressure/temperature steam

Biomass boiler: Produce high pressure, high temperature steam for hydrothermal reactor



Use as fuel



Product (Wet)

Dried product (Sold fuel)

Use as fuel

Using electricity

Electric Generator

※ Total recycling system.

※ Possible to generate electricity by using this fuel

Option: Generating electricity

Hopper with mixer

Loading MSW

Sorting conveyor

Pick up metal, stone, glass

Second hopper

Loading coveyor

Max 2.5Mph

Hydrothermal Treatment Reactor

Biomass boiler

Unloading screw conveyor

Green house Sun drying

Pelletizing (Solid fuel)

Valuable pellet fuel for sell

Product use for fuel of boiler

6. Size of HTT plant （40MT/D）

Case of Indonesia