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

**Now**
- Separate collection
  - Bulky waste
  - Non-combustible waste
  - Recyclable resources
  - Combustible waste

**Past Problems**
- Health issues, pests
- GHG emissions (CH4 etc.)
- Environmental pollution (offensive odors, leachate)
- Shortage of disposal sites

**Now Benefits**
- Lower environmental impacts
- Extended life of disposal sites
- Effective utilization of unused energy

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Four major incineration furnace types in Japan

The most proven technology

• **Stoker system (grate)**
• **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.

Example:
1 ton waste ⇒ 300 – 800 kWh of electricity
Dioxin emissions in Japan

The graph shows the emissions of dioxins in Japan from 1997 to 2015. Emissions are measured in g-TEQ/year. The graph distinguishes between different sources of emissions: Other, Industrial, Small incinerators, IW incinerators, and MSW incinerators. Emissions peaked in 1997 and have since declined significantly.
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

<table>
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<tr>
<th>Item</th>
<th>Units</th>
<th>Maximum permitted</th>
<th>At start-up</th>
<th>After 11 years</th>
<th>After 20 years</th>
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<td></td>
<td></td>
<td>Line 1</td>
<td>Line 2</td>
<td>Line 1</td>
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<tr>
<td>Dust</td>
<td>g/m³ N</td>
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<td>0.001</td>
<td>0.001</td>
<td>&lt; 0.001</td>
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<tr>
<td>SOx</td>
<td>ppm</td>
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<td>13</td>
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<tr>
<td>HCL</td>
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<tr>
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<tr>
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<td>&lt; 0.1</td>
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<td>0.035</td>
</tr>
</tbody>
</table>

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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.