Energy from Waste Reference Projects
by Hitachi Zosen since 2000
in chronological order
<table>
<thead>
<tr>
<th>Location</th>
<th>Start of operation</th>
<th>Combustion Concept</th>
<th>Fuel</th>
<th>Number of Lines</th>
<th>Throughput per line</th>
<th>Type of Operation</th>
<th>Energy Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>JP, Mito, Ibaraki</td>
<td>2020</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>3</td>
<td>4.58 t/h</td>
<td>JP, Yokosuka, Kanagawa</td>
<td>2020</td>
</tr>
<tr>
<td>JP, Yokosuka, Kanagawa</td>
<td>2019</td>
<td>Energy recovery</td>
<td>35.42 t/h</td>
<td>Electrical Power</td>
<td>11,17 t/h</td>
<td>CN, Shunde</td>
<td>2019</td>
</tr>
<tr>
<td>CN, Shunde</td>
<td>2019</td>
<td>Energy recovery</td>
<td>35.42 t/h</td>
<td>Electrical Power</td>
<td>11,17 t/h</td>
<td>CN, Jimo</td>
<td>2019</td>
</tr>
<tr>
<td>CN, Jimo</td>
<td>2019</td>
<td>Energy recovery</td>
<td>35.42 t/h</td>
<td>Electrical Power</td>
<td>11,17 t/h</td>
<td>CN, Tancheng</td>
<td>2019</td>
</tr>
<tr>
<td>Location</td>
<td>Start of operation</td>
<td>Combustion Concept</td>
<td>Fuel</td>
<td>Number of Lines</td>
<td>Throughput per line</td>
<td>Thermal power per line</td>
<td>Energy recovery</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------</td>
<td>--------------------</td>
<td>-------------------------------</td>
<td>-----------------</td>
<td>----------------------</td>
<td>------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td><strong>JP, Kyoto (Nambu No.2)</strong></td>
<td>2019</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>10.42 t/h</td>
<td>39.06 MW</td>
<td>Output</td>
</tr>
<tr>
<td><strong>JP, Nagano, Nagano</strong></td>
<td>2019</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>3</td>
<td>5.60 t/h</td>
<td>17.90 MW</td>
<td>Output</td>
</tr>
<tr>
<td><strong>TH, WPP Phetchaburi</strong></td>
<td>2019</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>1</td>
<td>19.83 t/h</td>
<td></td>
<td>Output</td>
</tr>
<tr>
<td><strong>GB, Ferrybridge Multifuel 2 (FM2)</strong></td>
<td>2019</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste, Refuse Derived Fuel</td>
<td>2</td>
<td>42.26 t/h</td>
<td>117.7 MW</td>
<td>Output</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-pass boiler</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SNCR, Fabric Filter, Semi-dry System</td>
<td>Calcium Hydroxide, Activated Carbon</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Condensation Turbine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electric power output</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Output</td>
</tr>
</tbody>
</table>

**Boiler Concept**: 5-pass boiler
**Steam**: 145 t/h at 73 bar(a) and 430 °C
**Flue gas treatment Concept**: SNCR, Fabric Filter, Semi-dry System
**Reactant**: Calcium Hydroxide, Activated Carbon

**Energy recovery Concept**: Condensation Turbine
**Electric power output**: 79.17 MW (gross)

**a company of Hitachi Zosen Corporation**
### GB, Edinburgh

<table>
<thead>
<tr>
<th>Start of operation</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion Concept</td>
<td>Air-cooled Grate</td>
</tr>
<tr>
<td>Fuel</td>
<td>Municipal Solid Waste, Refuse Derived Fuel</td>
</tr>
<tr>
<td>Number of Lines</td>
<td>1</td>
</tr>
<tr>
<td>Throughput per line</td>
<td>24.00 t/h</td>
</tr>
<tr>
<td>Thermal power per line</td>
<td>50.00 MW</td>
</tr>
<tr>
<td>Boiler Concept</td>
<td>6-pass boiler</td>
</tr>
<tr>
<td>Steam</td>
<td>64 t/h at 60 bar(a) and 400 °C</td>
</tr>
<tr>
<td>Flue gas treatment Concept</td>
<td>Entrainment reactor, Fabric Filter</td>
</tr>
<tr>
<td>Reactant</td>
<td>Calcium Hydroxide, Activated Carbon</td>
</tr>
<tr>
<td>Throughput per line</td>
<td>103'178 m³/h (STP)</td>
</tr>
<tr>
<td>Energy recovery Concept</td>
<td>Condensation Turbine</td>
</tr>
<tr>
<td>Electric power output</td>
<td>12.49 MW (gross)</td>
</tr>
<tr>
<td>Output</td>
<td>Electrical Power</td>
</tr>
</tbody>
</table>

### CN, Laohuchong

<table>
<thead>
<tr>
<th>Start of operation</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion Concept</td>
<td>Air-cooled Grate</td>
</tr>
<tr>
<td>Fuel</td>
<td>Municipal Solid Waste</td>
</tr>
<tr>
<td>Number of Lines</td>
<td>4</td>
</tr>
<tr>
<td>Throughput per line</td>
<td>31.25 t/h</td>
</tr>
</tbody>
</table>

### CN, Changsha

<table>
<thead>
<tr>
<th>Start of operation</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion Concept</td>
<td>Air-cooled Grate</td>
</tr>
<tr>
<td>Fuel</td>
<td>Refuse Derived Fuel, Municipal Solid Waste</td>
</tr>
<tr>
<td>Number of Lines</td>
<td>6</td>
</tr>
<tr>
<td>Throughput per line</td>
<td>35.42 t/h</td>
</tr>
<tr>
<td>Energy recovery Output</td>
<td>Electrical Power</td>
</tr>
</tbody>
</table>

### CN, Rénuái

<table>
<thead>
<tr>
<th>Start of operation</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion Concept</td>
<td>Air-cooled Grate</td>
</tr>
<tr>
<td>Fuel</td>
<td>Municipal Solid Waste</td>
</tr>
<tr>
<td>Number of Lines</td>
<td>2</td>
</tr>
<tr>
<td>Throughput per line</td>
<td>50.00 t/h</td>
</tr>
</tbody>
</table>
by Hitachi Zosen since 2000

**SE, Högbytorp**

- **Start of operation**: 2018
- **Anaerobic Digestion**
  - Number of Digesters: 3
  - Net volume per digester: 2100 m³
  - Design: Steel
  - Throughput per year: 83,050 t/a
  - Biogas Utilisation: Biomethane for gas-grid injection

**TH, Nong Khai**

- **Start of operation**: 2018
- **Combustion**
  - Concept: Air-cooled Grate
  - Fuel: Municipal Solid Waste
  - Lines: 1
  - Throughput per line: 15.42 t/h

**JP, Orii**

- **Start of operation**: 2018
- **Combustion**
  - Concept: Air-cooled Grate
  - Fuel: Municipal Solid Waste
  - Lines: 2
  - Throughput per line: 2.40 t/h

**JP, Yatsushiro, Kumamoto**

- **Start of operation**: 2018
- **Combustion**
  - Concept: Air-cooled Grate
  - Fuel: Municipal Solid Waste
  - Lines: 2
  - Throughput per line: 2.79 t/h
  - Thermal power per line: 9.93 MW
- **Energy recovery**
  - Concept: Condensation Turbine
  - Electric power output: 2.88 MW (gross)
  - Output: Electrical Power
by Hitachi Zosen since 2000

**JP, Neyagawa**

- Start of operation: 2018
- Combustion: Air-cooled Grate
- Fuel: Municipal Solid Waste
- Number of Lines: 2
- Throughput per line: 4.17 t/h
- Thermal power per line: 13.60 MW
- Flue gas treatment:
  - Concept: Entrainment reactor, Fabric Filter, SCR
  - Reactant: Calcium Hydroxide, Activated Carbon
- Throughput per line: 23'990 m³/h (STP)
- Energy recovery:
  - Output: Electrical Power

**CN, Pingxiang**

- Start of operation: 2018
- Combustion: Air-cooled Grate
- Fuel: Municipal Solid Waste
- Number of Lines: 2
- Throughput per line: 16.70 t/h

**CN, Nínghé**

- Start of operation: 2018
- Combustion: Air-cooled Grate
- Fuel: Municipal Solid Waste
- Number of Lines: 1
- Throughput per line: 20.83 t/h

**MY, SMART WTE**

- Start of operation: 2018
- Combustion: Air-cooled Grate
- Fuel: Municipal Solid Waste
- Number of Lines: 1
- Throughput per line: 25.00 t/h
- Thermal power per line: 69.44 MW
- Energy recovery:
  - Concept: Condensation Turbine
  - Electric power output: 17.70 MW (gross)
  - Output: Electrical Power
<table>
<thead>
<tr>
<th>Location</th>
<th>Start of operation</th>
<th>Combustion Concept</th>
<th>Fuel</th>
<th>Number of Lines</th>
<th>Throughput per line</th>
<th>Flue gas treatment Concept</th>
<th>Reactant</th>
<th>Energy recovery Output</th>
<th>Thermal power per line</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN, Dényang</td>
<td>2018</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>50.00 t/h</td>
<td></td>
<td></td>
<td></td>
<td>48.60 MW</td>
</tr>
<tr>
<td>CN, Huairou</td>
<td>2017</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>12.50 t/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CN, Ningbo</td>
<td>2017</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>3</td>
<td>31.25 t/h</td>
<td></td>
<td>Calcium Hydroxide, Sodium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CN, Chengdu Wanxing</td>
<td>2017</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>4</td>
<td>25.00 t/h</td>
<td>Fabric Filter, SCR, Semi-dry System, SNCR, PAC Entrainment</td>
<td>Calcium Hydroxide, Sodium</td>
<td>Bicarbonate, Activated Carbon</td>
<td>48.60 MW</td>
</tr>
<tr>
<td>CN, Yulin</td>
<td>2017</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>16.67 t/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Start of operation</td>
<td>Combustion Concept</td>
<td>Fuel</td>
<td>Number of Lines</td>
<td>Throughput per line</td>
<td>Thermal power per line</td>
<td>Flue gas treatment Concept</td>
<td>Reactant</td>
<td>Throughput per line</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------------</td>
<td>-------------------</td>
<td>------</td>
<td>----------------</td>
<td>--------------------</td>
<td>-----------------------</td>
<td>---------------------------</td>
<td>----------</td>
<td>-------------------</td>
</tr>
<tr>
<td>JP, Joetsu, Niigata</td>
<td>2017</td>
<td>Water-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>3.54 t/h</td>
<td>15.60 MW</td>
<td>SNCR, Entrainment reactor, Fabric Filter</td>
<td>Calcium Hydroxide, Activated Carbon</td>
<td>20'330 m³/h (STP)</td>
</tr>
<tr>
<td>CN, Bazhou</td>
<td>2017</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>25.00 t/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CN, Muping</td>
<td>2017</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>16.70 t/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CN, Tonghua</td>
<td>2017</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>16.70 t/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**CN, Meishan**

- **Start of operation**: 2017
- **Combustion Concept**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 2
- **Throughput per line**: 20.83 t/h

**CN, Shijiazhuang**

- **Start of operation**: 2017
- **Combustion Concept**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 1
- **Throughput per line**: 31.25 t/h

**IE, Dublin**

- **Start of operation**: 2017
- **Combustion Concept**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 2
- **Throughput per line**: 41.00 t/h
- **Thermal power per line**: 102.5 MW
- **Boiler Concept**: 4-pass boiler
- **Steam**: 125 t/h at 62 bar(a) and 443 °C
- **Flue gas treatment Concept**: SNCR, Fabric Filter, Scrubber, Semi-dry System
- **Scrubber Reactant**: Caustic Soda
- **Reactant**: Lignite Coke, Calcium Hydroxide
- **Throughput per line**: 189'000 m³/h (STP)
- **Energy recovery Concept**: Condensation Turbine
- **Electric power output**: 68.80 MW (gross)
- **Output**: Electrical Power, Hot Water

**CN, Lhasa**

- **Start of operation**: 2017
- **Combustion Concept**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 2
- **Throughput per line**: 14.60 t/h
CN, Wuhu
Start of operation: 2017
Combustion Concept: Air-cooled Grate
Fuel: Municipal Solid Waste
Number of Lines: 2
Throughput per line: 25.00 t/h

CN, Bozhou
Start of operation: 2017
Combustion Concept: Air-cooled Grate
Fuel: Municipal Solid Waste
Number of Lines: 2
Throughput per line: 12.50 t/h

CN, Kaixian
Start of operation: 2017
Combustion Concept: Air-cooled Grate
Fuel: Municipal Solid Waste
Number of Lines: 2
Throughput per line: 12.50 t/h

CN, Linqu
Start of operation: 2017
Combustion Concept: Air-cooled Grate
Fuel: Municipal Solid Waste
Number of Lines: 2
Throughput per line: 12.50 t/h

CN, Huaxi
Start of operation: 2017
Combustion Concept: Air-cooled Grate
Fuel: Municipal Solid Waste
Number of Lines: 2
Throughput per line: 25.00 t/h
<table>
<thead>
<tr>
<th>Location</th>
<th>Start of operation</th>
<th>Combustion Concept</th>
<th>Fuel</th>
<th>Number of Lines</th>
<th>Throughput per line</th>
<th>Thermal power per line</th>
<th>Energy Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>VN, Hanoi</td>
<td>2017</td>
<td>Rotary Kiln</td>
<td>Industrial Waste</td>
<td>1</td>
<td>3.13 t/h</td>
<td></td>
<td>Electrical Power</td>
</tr>
<tr>
<td>GB, Herefordshire and Worcestershire</td>
<td>2017</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>1</td>
<td>30.55 t/h</td>
<td>67.89 MW</td>
<td>Electric Power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-pass boiler</td>
<td></td>
<td></td>
<td>89 t/h at 60 bar(a) and 415 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SNCR, Fabric Filter, Semi-dry System</td>
<td>Calcium Hydroxide, Activated Carbon</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>126'000 m³/h (STP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CN, Haikou II</td>
<td>2017</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>25.00 t/h</td>
<td>49.31 MW</td>
<td>20.00 MW (gross)</td>
</tr>
<tr>
<td>CN, Guangan</td>
<td>2017</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>12.50 t/h</td>
<td>23.26 MW</td>
<td>55'266 m³/h (STP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Start of operation</td>
<td>Combustion Concept</td>
<td>Fuel</td>
<td>Number of Lines</td>
<td>Throughput per line</td>
<td>Thermal power per line</td>
<td>Flue gas treatment Concept</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------</td>
<td>---------------------</td>
<td>-----------------------</td>
<td>-----------------</td>
<td>----------------------</td>
<td>-------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>CN, Xiamen (Ruikepang reCulture)</td>
<td>2017</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>1</td>
<td>10.42 t/h</td>
<td>24.05 MW</td>
<td>Concept</td>
</tr>
<tr>
<td>JP, Tokyo (Suginami)</td>
<td>2017</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>12.50 t/h</td>
<td>49.70 MW</td>
<td>Concept</td>
</tr>
<tr>
<td>CN, Zhuhai</td>
<td>2016</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>25.00 t/h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JP, Fujimino, Saitama</td>
<td>2016</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>3.00 t/h</td>
<td>10.30 MW</td>
<td></td>
</tr>
</tbody>
</table>
**PL, Poznan**

- Start of operation: 2016
- Combustion Concept: Air-cooled Grate
- Fuel: Municipal Solid Waste
- Number of Lines: 2
- Throughput per line: 15.00 t/h
- Thermal power per line: 31.50 MW
- Boiler Concept: 4-pass boiler
- Steam: 38 t/h at 62 bar(a) and 422 °C
- Flue gas treatment Concept: SNCR, Semi-dry System, Fabric Filter
- Reactant: Calcium Hydroxide
- Throughput per line: 66'000 m³/h (STP)
- Energy recovery Concept: Condensation Turbine
- Electric power output: 17.30 MW (gross)
- Output: Electrical Power, Hot Water

**GB, Severnside L1, L2**

- Start of operation: 2016
- Combustion Concept: Air-cooled Grate
- Fuel: Municipal Solid Waste
- Number of Lines: 2
- Throughput per line: 24.24 t/h
- Thermal power per line: 62.61 MW
- Boiler Concept: 5-pass boiler
- Steam: 78 t/h at 62 bar(a) and 422 °C
- Flue gas treatment Concept: SNCR, Semi-dry System, Fabric Filter
- Reactant: Calcium Hydroxide
- Throughput per line: 127'000 m³/h (STP)
- Energy recovery Concept: Condensation Turbine
- Electric power output: 37.40 MW (gross)
- Output: Electrical Power

**IN, Essel Jabalpur**

- Start of operation: 2016
- Combustion Concept: Air-cooled Grate
- Fuel: Municipal Solid Waste
- Number of Lines: 1
- Throughput per line: 25.00 t/h
- Thermal power per line: 47.97 MW
- Boiler Concept: 4-pass boiler
- Steam: 57 t/h at 46 bar(a) and 0 °C
- Flue gas treatment Concept: Evaporation cooler, Fabric Filter
- Reactant: Calcium Hydroxide, Activated Carbon
- Throughput per line: 112'178 m³/h (STP)

**TH, Bangkok (Nong Khaem)**

- Start of operation: 2016
- Combustion Concept: Air-cooled Grate
- Fuel: Municipal Solid Waste
- Number of Lines: 2
- Throughput per line: 10.40 t/h

**by Hitachi Zosen since 2000**
**JP, Tsuyama, Okayama**

- **Start of operation**: 2016
- **Combustion Concept**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 2
- **Throughput per line**: 2.67 t/h
- **Thermal power per line**: 9.40 MW

**CN, Wuxi Xidong**

- **Start of operation**: 2016
- **Combustion Concept**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 4
- **Throughput per line**: 20.83 t/h
- **Thermal power per line**: 38.77 MW
- **Flue gas treatment Concept**: SNCR, Spray Absorber, Fabric Filter
- **Reactant**: Activated Carbon, Calcium Hydroxide
- **Throughput per line**: 100'950 m³/h (STP)
- **Energy recovery Output**: Electrical Power

**CN, Yongji**

- **Start of operation**: 2015
- **Combustion Concept**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 1
- **Throughput per line**: 10.40 t/h

**PL, Jarocin**

- **Start of operation**: 2015
- **Anaerobic Digestion Concept**: Organic Fraction of Municipal Solid Waste
- **Number of Digester(s)**: 1
- **Net volume per digester**: 1300 m³
- **Concrete Type**: RM18
- **Waste Type**: Organic Fraction of Municipal Solid Waste
- **Waste Throughput per Year**: 15000 t/a
- **Biogas Utilisation**: Combined Heat and Power
### GB, Buckinghamshire

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Start of operation</strong></td>
<td>2015</td>
</tr>
<tr>
<td><strong>Combustion Concept</strong></td>
<td>Air-cooled Grate</td>
</tr>
<tr>
<td><strong>Fuel</strong></td>
<td>Municipal Solid Waste, Industrial Waste</td>
</tr>
<tr>
<td><strong>Number of Lines</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Throughput per line</strong></td>
<td>39.40 t/h</td>
</tr>
<tr>
<td><strong>Thermal power per line</strong></td>
<td>101.7 MW</td>
</tr>
<tr>
<td><strong>Boiler Concept</strong></td>
<td>5-pass boiler</td>
</tr>
<tr>
<td><strong>Steam</strong></td>
<td>127 t/h at 52 bar(a) and 402 °C</td>
</tr>
<tr>
<td><strong>Flue gas treatment Concept</strong></td>
<td>SNCR, Fabric Filter, Semi-dry System</td>
</tr>
<tr>
<td><strong>Reactant</strong></td>
<td>Activated Carbon, Calcium Hydroxide</td>
</tr>
<tr>
<td><strong>Throughput per line</strong></td>
<td>180'714 m³/h (STP)</td>
</tr>
<tr>
<td><strong>Energy recovery Concept</strong></td>
<td>Condensation Turbine</td>
</tr>
<tr>
<td><strong>Electric power output</strong></td>
<td>26.50 MW (gross)</td>
</tr>
</tbody>
</table>

### JP, Namie

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Start of operation</strong></td>
<td>2015</td>
</tr>
<tr>
<td><strong>Combustion Concept</strong></td>
<td>Air-cooled Grate</td>
</tr>
<tr>
<td><strong>Fuel</strong></td>
<td>Radioactive waste</td>
</tr>
<tr>
<td><strong>Number of Lines</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Throughput per line</strong></td>
<td>12.50 t/h</td>
</tr>
<tr>
<td><strong>Thermal power per line</strong></td>
<td>45.00 MW</td>
</tr>
<tr>
<td><strong>Flue gas treatment Concept</strong></td>
<td>Entrainment reactor, Fabric Filter</td>
</tr>
<tr>
<td><strong>Reactant</strong></td>
<td>Calcium Hydroxide, Activated Carbon</td>
</tr>
<tr>
<td><strong>Throughput per line</strong></td>
<td>154'040 m³/h (STP)</td>
</tr>
</tbody>
</table>

### CH, Horgen

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Start of operation</strong></td>
<td>2015</td>
</tr>
<tr>
<td><strong>Combustion Concept</strong></td>
<td>Water-cooled Grate</td>
</tr>
<tr>
<td><strong>Fuel</strong></td>
<td>Municipal Solid Waste</td>
</tr>
<tr>
<td><strong>Number of Lines</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Throughput per line</strong></td>
<td>4.20 t/h</td>
</tr>
<tr>
<td><strong>Thermal power per line</strong></td>
<td>15.00 MW</td>
</tr>
<tr>
<td><strong>Boiler Concept</strong></td>
<td>3-pass boiler with external economizer</td>
</tr>
<tr>
<td><strong>Steam</strong></td>
<td>18 t/h at 30 bar(a) and 0 °C</td>
</tr>
<tr>
<td><strong>Flue gas treatment Concept</strong></td>
<td>Entrainment reactor, Electrostatic Precipitator, Fabric Filter, Heat exchanger, SCR</td>
</tr>
<tr>
<td><strong>Reactant</strong></td>
<td>Adsorbent, Sodium Bicarbonate</td>
</tr>
<tr>
<td><strong>Throughput per line</strong></td>
<td>25'300 m³/h (STP)</td>
</tr>
<tr>
<td>Location</td>
<td>Start of operation</td>
</tr>
<tr>
<td>----------</td>
<td>--------------------</td>
</tr>
<tr>
<td>GB, Ferrybridge</td>
<td>2015</td>
</tr>
<tr>
<td>CN, Yingtan</td>
<td>2015</td>
</tr>
<tr>
<td>CN, Shanghai Chongming</td>
<td>2015</td>
</tr>
<tr>
<td>JP, Hagi Nagato, Yamaguchi</td>
<td>2015</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Energy Recovery</th>
<th>GB, Ferrybridge</th>
<th>CN, Yingtan</th>
<th>CN, Shanghai Chongming</th>
<th>JP, Hagi Nagato, Yamaguchi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>Steam, Electrical Power</td>
<td>Condensation Turbine</td>
<td>Heat Exchanger, Semi-dry System</td>
<td>Hot Water</td>
</tr>
<tr>
<td>Location</td>
<td>Start of operation</td>
<td>Combustion Concept</td>
<td>Fuel</td>
<td>Number of Lines</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------</td>
<td>-------------------</td>
<td>---------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td><strong>JP, Gotemba Oyama, Shizuoka</strong></td>
<td>2015</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>JP, Murakami, Niigata</strong></td>
<td>2015</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste, Sewage Sludge</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CN, Nanchong</strong></td>
<td>2015</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CN, Xiamen West</strong></td>
<td>2015</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Start of operation</td>
<td>Combustion Concept</td>
<td>Fuel</td>
<td>Number of Lines</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------</td>
<td>--------------------</td>
<td>------</td>
<td>-----------------</td>
</tr>
<tr>
<td>CH, Lucerne Perlen</td>
<td>2015</td>
<td>Water-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
</tr>
<tr>
<td>CN, Shanghai Liming</td>
<td>2014</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>4</td>
</tr>
<tr>
<td>CN, Xiangtan</td>
<td>2014</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>4</td>
</tr>
<tr>
<td>CN, Sanya</td>
<td>2014</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
</tr>
</tbody>
</table>

| Boiler Concept | Steam | 57 t/h at 41 bar(a) and 410 °C |
| Reactant | Sodium Bicarbonate, Lignite Coke, Calcium Hydroxide |
| Energy recovery Concept | Condensation Turbine | 78,000 m³/h (STP) |
| Output | Steam, Electrical Power, Hot Water |

| Boiler Concept | 4-pass boiler with external economizer |
| Reactant | Sodium Bicarbonate, Lignite Coke, Calcium Hydroxide |
| Energy recovery Concept | Condensation Turbine | 78,000 m³/h (STP) |
| Output | Steam, Electrical Power, Hot Water |

| Boiler Concept | 4-pass boiler with external economizer |
| Reactant | Sodium Bicarbonate, Lignite Coke, Calcium Hydroxide |
| Energy recovery Concept | Condensation Turbine | 78,000 m³/h (STP) |
| Output | Steam, Electrical Power, Hot Water |

| Boiler Concept | 4-pass boiler with external economizer |
| Reactant | Sodium Bicarbonate, Lignite Coke, Calcium Hydroxide |
| Energy recovery Concept | Condensation Turbine | 78,000 m³/h (STP) |
| Output | Steam, Electrical Power, Hot Water |

| Boiler Concept | 4-pass boiler with external economizer |
| Reactant | Sodium Bicarbonate, Lignite Coke, Calcium Hydroxide |
| Energy recovery Concept | Condensation Turbine | 78,000 m³/h (STP) |
| Output | Steam, Electrical Power, Hot Water |
### CN, Shanghai Laogang
- **Start of operation**: 2014
- **Combustion Concept**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 4
- **Throughput per line**: 31.25 t/h
- **Thermal power per line**: 61.80 MW
- **Flue gas treatment Concept**: SNCR, Entrainment reactor, Fabric Filter, Scrubber
- **Reactant**: Calcium Hydroxide, Activated Carbon
- **Throughput per line**: 161'900 m³/h (STP)
- **Energy recovery Output**: Electrical Power

### CN, Harbin
- **Start of operation**: 2014
- **Combustion Concept**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 2
- **Throughput per line**: 25.00 t/h
- **Flue gas treatment Concept**: Semi-dry System, Fabric Filter

### JP, Bekki Hayami, Oita
- **Start of operation**: 2014
- **Combustion Concept**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 2
- **Throughput per line**: 4.90 t/h
- **Thermal power per line**: 14.60 MW
- **Flue gas treatment Concept**: Electrical Power

### CN, Tianjin Binghai
- **Start of operation**: 2014
- **Combustion Concept**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 2
- **Throughput per line**: 20.83 t/h
- **Thermal power per line**: 38.80 MW
- **Flue gas treatment Concept**: SNCR, Spray Absorber, Fabric Filter
- **Reactant**: Calcium Hydroxide, Activated Carbon
- **Throughput per line**: 100'250 m³/h (STP)
- **Energy recovery Output**: Electrical Power
<table>
<thead>
<tr>
<th>Location</th>
<th>Start of operation</th>
<th>Combustion Concept</th>
<th>Fuel</th>
<th>Number of Lines</th>
<th>Throughput per line</th>
<th>Flue gas treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN, Zhuzhou</td>
<td>2014</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>20.83 t/h</td>
<td>Entrainment reactor, Semi-dry System</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CN, Rongcheng</td>
<td>2014</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>14.58 t/h</td>
<td>Entrainment reactor, Fabric Filter, Semi-dry System</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CN, Shuyang</td>
<td>2014</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>14.58 t/h</td>
<td>Semi-dry System, Fabric Filter</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CN, Xingyi</td>
<td>2014</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>12.50 t/h</td>
<td>Semi-dry System, Entrainment reactor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FI, Vantaa</td>
<td>2014</td>
<td>Water-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>24.00 t/h</td>
<td>64.20 MW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4-pass boiler with external economizer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steam</td>
<td>83 t/h at 91 bar(a) and 400 °C</td>
<td>111'100 m³/h (STP)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### CN, Dalian

- **Combustion Concept:** Air-cooled Grate
- **Fuel:** Municipal Solid Waste
- **Number of Lines:** 3
- **Thermal power per line:** 38.80 MW
- **Flue gas treatment Concept:** SNCR, Spray Absorber, Fabric Filter
- **Reactant:** Activated Carbon, Calcium Hydroxide
- **Throughput per line:** 100-250 m³/h (STP)
- **Energy recovery Output:** Electrical Power

### CH, Winterthur

- **Anaerobic Digestion Number of Digester(s):** 1
- **Net volume per digester:** 1500 m³
- **Digester Design:** Steel
- **Waste Type:** Bio Waste, Food Waste, Green Waste
- **Waste Throughput per Year:** 25000 t/a
- **Biogas Utilisation:** Biomethane for gas-grid injection

### CH, Vétroz

- **Anaerobic Digestion Number of Digester(s):** 1
- **Net volume per digester:** 1300 m³
- **Digester Design:** Concrete
- **Digester Type:** PF1300
- **Waste Type:** Bio Waste, Green Waste, Liquid Manure, Waste Oil
- **Waste Throughput per Year:** 20000 t/a
- **Biogas Utilisation:** Biomethane for gas-grid injection

### PT, Amarsul

- **Anaerobic Digestion Number of Digester(s):** 3
- **Net volume per digester:** 1300 m³
- **Digester Design:** Concrete
- **Digester Type:** PF1300
- **Waste Type:** Organic Fraction of Municipal Solid Waste
- **Waste Throughput per Year:** 60000 t/a
- **Biogas Utilisation:** Combined Heat and Power
### PL, Olawa
- **Start of operation**: 2014
- **Anaerobic Digestion**
  - **Number of Digester(s)**: 2
  - **Net volume per digester**: 1300 m³
  - **Digester Design**: Concrete
  - **Digester Type**: RM18
  - **Waste Type**: Organic Fraction of Municipal Solid Waste
  - **Waste Throughput per Year**: 25000 t/a
  - **Biogas Utilisation**: Combined Heat and Power

### KR, Namyangju
- **Start of operation**: 2013
- **Combustion**
  - **Concept**: Fluidized Bed Gasification
  - **Fuel**: Municipal Solid Waste
  - **Number of Lines**: 1
  - **Throughput per line**: 2.66 t/h

### CN, Changshu
- **Start of operation**: 2013
- **Combustion**
  - **Concept**: Air-cooled Grate
  - **Fuel**: Municipal Solid Waste
  - **Number of Lines**: 3
  - **Throughput per line**: 12.50 t/h
  - **Flue gas treatment**: Semi-dry System, Fabric Filter

### CN, Yantai
- **Start of operation**: 2013
- **Combustion**
  - **Concept**: Air-cooled Grate
  - **Fuel**: Municipal Solid Waste
  - **Number of Lines**: 2
  - **Throughput per line**: 20.83 t/h
  - **Flue gas treatment**: Entrainment reactor, Fabric Filter, Semi-dry System

### JP, Nantan
- **Start of operation**: 2013
- **Anaerobic Digestion**
  - **Number of Digester(s)**: 1
  - **Net volume per digester**: 1030 m³
  - **Digester Design**: Steel
  - **Waste Type**: Organic Fraction of Municipal Solid Waste
  - **Waste Throughput per Year**: 10800 t/a
  - **Biogas Utilisation**: Combined Heat and Power
### JP, Nishiharima, Hyogo
- **Start of operation**: 2013
- **Combustion**:
  - Fuel: Municipal Solid Waste
  - Number of Lines: 2
  - Throughput per line: 1.85 t/h
  - Thermal power per line: 5.80 MW
- **Energy recovery**:
  - Output: Electrical Power, Hot Water

### JP, Matsuyama, Ehime
- **Start of operation**: 2013
- **Combustion**:
  - Fuel: Municipal Solid Waste
  - Number of Lines: 3
  - Throughput per line: 5.83 t/h
  - Thermal power per line: 16.90 MW
- **Energy recovery**:
  - Output: Electrical Power

### JP, Nakakita Sorachi, Hokkaido
- **Start of operation**: 2013
- **Combustion**:
  - Fuel: Municipal Solid Waste
  - Number of Lines: 2
  - Throughput per line: 1.77 t/h
  - Thermal power per line: 8.20 MW
- **Boiler**:
  - Concept: 3-pass boiler
  - Steam
- **Energy recovery**:
  - Output: Electrical Power

### DE, Coesfeld
- **Start of operation**: 2013
- **Anaerobic Digestion**:
  - Number of Digester(s): 2
  - Net volume per digester: 1300 m³
  - Digestor Design: Concrete
  - Digester Type: PF1300
  - Waste Type: Bio Waste, Green Waste
  - Waste Throughput per Year: 40000 t/a
  - Biogas Utilisation: Biomethane for gas-grid injection

### JP, Hadano Isehara, Kanagawa
- **Start of operation**: 2013
- **Combustion**:
  - Fuel: Municipal Solid Waste
  - Number of Lines: 2
  - Throughput per line: 4.16 t/h
  - Thermal power per line: 13.30 MW
- **Energy recovery**:
  - Output: Electrical Power
### CN, Haikou
- **Start of operation:** 2013
- **Combustion Concept:** Air-cooled Grate
- **Fuel:** Municipal Solid Waste
- **Number of Lines:** 2
- **Throughput per line:** 25.00 t/h
- **Thermal power per line:** 46.00 MW
- **Flue gas treatment Concept:** SNCR, Semi-dry System, Fabric Filter
- **Reactant:** Calcium Hydroxide, Activated Carbon
- **Throughput per line:** 121,220 m³/h (STP)
- **Energy recovery Output:** Electrical Power

### CN, Rudong II
- **Start of operation:** 2013
- **Combustion Concept:** Air-cooled Grate
- **Fuel:** Municipal Solid Waste
- **Number of Lines:** 1
- **Throughput per line:** 20.83 t/h
- **Flue gas treatment Concept:** Entrainment reactor, Fabric Filter

### CN, Longyan
- **Start of operation:** 2013
- **Combustion Concept:** Air-cooled Grate
- **Fuel:** Municipal Solid Waste
- **Number of Lines:** 2
- **Throughput per line:** 12.50 t/h
- **Flue gas treatment Concept:** Entrainment reactor, Semi-dry System, Fabric Filter

### GB, Cleveland L4, L5
- **Start of operation:** 2013
- **Combustion Concept:** Air-cooled Grate
- **Fuel:** Municipal Solid Waste, Industrial Waste
- **Number of Lines:** 2
- **Throughput per line:** 19.00 t/h
- **Thermal power per line:** 45.85 MW
- **Boiler Concept:** 4-pass boiler
- **Steam:** 56 t/h at 50 bar(a) and 410 °C
- **Flue gas treatment Concept:** SNCR, Fabric Filter, Semi-dry System
- **Reactant:** Activated Carbon, Calcium Hydroxide
- **Throughput per line:** 95,400 m³/h (STP)
- **Energy recovery Concept:** Condensation Turbine
- **Electric power output:** 26.00 MW (gross)
- **Output:** Electrical Power
DE, Fulda
Start of operation 2013
Anaerobic Digestion
- Number of Digester(s): 2
- Net volume per digester: 1300 m³
- Digester Design: PF1300
- Waste Type: Bio Waste, Green Waste
- Waste Throughput per Year: 32000 t/a
- Biogas Utilisation: Biomethane for gas-grid injection

NL, Tilburg
Start of operation 2013
Anaerobic Digestion
- Number of Digester(s): 2
- Net volume per digester: 1300 m³
- Digester Design: PF1300
- Waste Type: Bio Waste, Green Waste
- Waste Throughput per Year: 46000 t/a
- Biogas Utilisation: Biomethane for gas-grid injection

CH, Zurich Werdhölzli
Start of operation 2013
Anaerobic Digestion
- Number of Digester(s): 1
- Net volume per digester: 1500 m³
- Digester Design: Steel
- Waste Type: Bio Waste, Food Waste, Green Waste
- Waste Throughput per Year: 25000 t/a
- Biogas Utilisation: Biomethane for gas-grid injection

FR, Clermont-Ferrand
Start of operation 2013
Anaerobic Digestion
- Number of Digester(s): 1
- Net volume per digester: 1300 m³
- Digester Design: PF1300
- Waste Type: Bio Waste, Green Waste
- Waste Throughput per Year: 15000 t/a
- Biogas Utilisation: Combined Heat and Power

JP, Hofu
Start of operation 2013
Anaerobic Digestion
- Number of Digester(s): 2
- Net volume per digester: 750 m³
- Digester Design: Steel
- Waste Type: Organic Fraction of Municipal Solid Waste
- Waste Throughput per Year: 17500 t/a
- Biogas Utilisation: Combined Heat and Power
<table>
<thead>
<tr>
<th>Location</th>
<th>Start of operation</th>
<th>Combustion</th>
<th>Fuel</th>
<th>Number of Lines</th>
<th>Throughput per line</th>
<th>Flue gas treatment</th>
<th>Energy recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CN, Huzhou</strong></td>
<td>2012</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>1</td>
<td>8.33 t/h</td>
<td>Fabric Filter, Semi-dry System, SNCR</td>
<td>Electrical Power</td>
</tr>
<tr>
<td><strong>Fl, Vaasa</strong></td>
<td>2012</td>
<td>Water-cooled Grate</td>
<td>Municipal Solid Waste, Industrial Waste</td>
<td>1</td>
<td>20.00 t/h</td>
<td>4-pass boiler</td>
<td>SNCR</td>
</tr>
<tr>
<td><strong>ES, Sant Adrià de Besòs L1-L3</strong></td>
<td>2012</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste, Industrial Waste</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Flue gas treatment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Energy recovery</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### CN, Ningde
- **Start of operation**: 2012
- **Combustion Concept**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 2
- **Throughput per line**: 12.50 t/h
- **Flue gas treatment Concept**: Entrainment reactor, Semi-dry System, Fabric Filter

### TH, Phuket
- **Start of operation**: 2012
- **Combustion Concept**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 2
- **Throughput per line**: 14.58 t/h
- **Flue gas treatment Concept**: Semi-dry System, Fabric Filter

### CH, Limmattal
- **Start of operation**: 2012
- **Flue gas treatment Concept**: PAC Entrainment
- **Number of Lines**: 2
- **Fuel**: Municipal Solid Waste
- **Reactant**: Activated Carbon
- **Throughput per line**: 47'000 m³/h (STP)

### DE, Witten
- **Start of operation**: 2012
- **Anaerobic Digestion**: Combined Heat and Power
- **Number of Digester(s)**: 1
- **Net volume per digester**: 1300 m³
- **Digestor Design**: Concrete
- **Digestor Type**: PF1300
- **Waste Type**: Bio Waste, Green Waste
- **Waste Throughput per Year**: 26300 t/a
- **Biogas Utilisation**: Combined Heat and Power
DE, Tritttau
Start of operation: 2012
Anaerobic Digestion
Number of Digester(s): 1
Net volume per digester: 1300 m³
Digester Design: Concrete
Digester Type: PF1300
Waste Type: Bio Waste
Waste Throughput per Year: 20000 t/a
Biogas Utilisation: Combined Heat and Power

IT, Faedo
Start of operation: 2012
Anaerobic Digestion
Number of Digester(s): 2
Net volume per digester: 1300 m³
Digester Design: Concrete
Digester Type: PF1300
Waste Type: Bio Waste, Green Waste
Waste Throughput per Year: 32000 t/a
Biogas Utilisation: Combined Heat and Power

IT, Terni
Start of operation: 2012
Anaerobic Digestion
Number of Digester(s): 1
Net volume per digester: 1300 m³
Digester Design: Concrete
Digester Type: PF1300
Waste Type: Bio Waste, Green Waste
Waste Throughput per Year: 17500 t/a
Biogas Utilisation: Combined Heat and Power

NL, Weurt
Start of operation: 2012
Anaerobic Digestion
Number of Digester(s): 2
Net volume per digester: 1300 m³
Digester Design: Concrete
Digester Type: PF1300
Waste Type: Bio Waste, Green Waste
Waste Throughput per Year: 38000 t/a
Biogas Utilisation: Biomethane for gas-grid injection

IT, Novi Ligure
Start of operation: 2012
Anaerobic Digestion
Number of Digester(s): 1
Net volume per digester: 1300 m³
Digester Design: Concrete
Digester Type: PF1300
Waste Type: Bio Waste, Green Waste
Waste Throughput per Year: 16800 t/a
Biogas Utilisation: Combined Heat and Power
### FR, Vannes
- **Start of operation**: 2012
- **Anaerobic Digestion**
  - **Number of Digester(s)**: 1
  - **Net volume per digester**: 1300 m³
  - **Digester Design**: Concrete
  - **Digester Type**: PF1300
  - **Waste Type**: Organic Fraction of Municipal Solid Waste
  - **Waste Throughput per Year**: 15000 t/a
  - **Biogas Utilisation**: Combined Heat and Power

### FR, Angers
- **Start of operation**: 2012
- **Anaerobic Digestion**
  - **Number of Digester(s)**: 4
  - **Net volume per digester**: 1300 m³
  - **Digester Design**: Concrete
  - **Digester Type**: PF1300
  - **Waste Type**: Organic Fraction of Municipal Solid Waste
  - **Waste Throughput per Year**: 50000 t/a
  - **Biogas Utilisation**: Combined Heat and Power

### FR, Forbach
- **Start of operation**: 2011
- **Anaerobic Digestion**
  - **Number of Digester(s)**: 3
  - **Net volume per digester**: 1300 m³
  - **Digester Design**: Concrete
  - **Digester Type**: PF1300
  - **Waste Type**: Bio Waste, Green Waste
  - **Waste Throughput per Year**: 42000 t/a
  - **Biogas Utilisation**: Combined Heat and Power

### GB, Newhaven
- **Start of operation**: 2011
- **Combustion**
  - **Concept**: Air-cooled Grate
  - **Fuel**: Municipal Solid Waste
  - **Number of Lines**: 2
  - **Throughput per line**: 14.50 t/h
  - **Thermal power per line**: 35.85 MW
  - **Boiler Concept**: 4-pass boiler
  - **Steam**: 44 t/h at 50 bar (a) and 400 °C
  - **Flue gas treatment Concept**: SNCR, Semi-dry System, Fabric Filter
  - **Throughput per line**: 75’600 m³/h (STP)
  - **Energy recovery Concept**: Condensation Turbine
  - **Electric power output**: 19.25 MW (gross)
  - **Output**: Electrical Power
**NO, Oslo**

- **Start of operation:** 2011
- **Combustion Concept:** Water-cooled Grate
- **Fuel:** Municipal Solid Waste, Industrial Waste
- **Number of Lines:** 1
- **Throughput per line:** 24.00 t/h
- **Thermal power per line:** 66.70 MW
- **Boiler Concept:** 4-pass boiler
- **Steam:** 78 t/h at 42 bar(a) and 402 °C
- **Flue gas treatment Concept:** Electrostatic Precipitator (3 Fields), Heat Exchanger, Scrubber, Heat exchanger, Heat exchanger 2, Heat exchanger 3, SCR, Heat exchanger 2
- **Scrubber Reactant:** Lye
- **Throughput per line:** 130'000 m³/h (STP)
- **Energy recovery Concept:** Back-pressure Turbine
- **Electric power output:** 12.80 MW (gross)
- **Output:** Hot Water, Electrical Power

**JP, Iwata Bannan II, Shizuoka**

- **Start of operation:** 2011
- **Combustion Fuel:** Municipal Solid Waste
- **Number of Lines:** 2
- **Throughput per line:** 4.67 t/h
- **Thermal power per line:** 3.00 MW
- **Energy recovery Output:** Hot Water, Electrical Power

**GB, Riverside, London**

- **Start of operation:** 2011
- **Combustion Concept:** Air-cooled Grate
- **Fuel:** Municipal Solid Waste, Industrial Waste
- **Number of Lines:** 3
- **Throughput per line:** 32.44 t/h
- **Thermal power per line:** 81.10 MW
- **Boiler Concept:** 4-pass boiler
- **Steam:** 99 t/h at 72 bar(a) and 427 °C
- **Flue gas treatment Concept:** SNCR, Semi-dry System, Fabric Filter
- **Throughput per line:** 169'800 m³/h (STP)
- **Energy recovery Concept:** Condensation Turbine
- **Electric power output:** 73.00 MW (gross)
- **Output:** Electrical Power
<table>
<thead>
<tr>
<th>Location</th>
<th>Combustion Concept</th>
<th>Fuel</th>
<th>Number of Lines</th>
<th>Throughput per line</th>
<th>Thermal power per line</th>
</tr>
</thead>
<tbody>
<tr>
<td>NL, Roosendaal</td>
<td>Water-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>21.00 t/h</td>
<td>62.00 MW</td>
</tr>
<tr>
<td>DE, Neunkirchen EEW</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>50'000 m³/h (STP)</td>
<td>28.70 MW (gross)</td>
</tr>
<tr>
<td>CN, Rudong</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>10.42 t/h</td>
<td>28.70 MW</td>
</tr>
<tr>
<td>CN, Xiangyang</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>16.67 t/h</td>
<td>28.70 MW</td>
</tr>
</tbody>
</table>

**Boiler Concept**
- NL, Roosendaal: 5-pass boiler
- DE, Neunkirchen EEW: 5-pass boiler
- CN, Rudong: 5-pass boiler
- CN, Xiangyang: 5-pass boiler

**Steam Output**
- NL, Roosendaal: 76 t/h at 62 bar(a) and 422 °C
- DE, Neunkirchen EEW: 50'000 m³/h (STP)
- CN, Rudong: 127'000 m³/h (STP)
- CN, Xiangyang: 127'000 m³/h (STP)

**Flue gas treatment**
- NL, Roosendaal: Entrainment reactor, Fabric Filter, SCR
- DE, Neunkirchen EEW: Spray Dryer, Fabric Filter, Scrubber
- CN, Rudong: Entrainment reactor, Fabric Filter
- CN, Xiangyang: Semi-dry System, Fabric Filter

**Energy Recovery Concept**
- NL, Roosendaal: Condensation Turbine
- DE, Neunkirchen EEW: Condensation Turbine
- CN, Rudong: Condensation Turbine
- CN, Xiangyang: Condensation Turbine

<table>
<thead>
<tr>
<th>Location</th>
<th>Start of operation</th>
<th>Flue gas treatment Concept</th>
<th>Reactant</th>
<th>Throughput per line</th>
</tr>
</thead>
<tbody>
<tr>
<td>NL, Roosendaal</td>
<td>2011</td>
<td>Concept</td>
<td>Sodium Bicarbonate</td>
<td>127'000 m³/h (STP)</td>
</tr>
<tr>
<td>DE, Neunkirchen EEW</td>
<td>2011</td>
<td>Concept</td>
<td>Sodium Bicarbonate</td>
<td>127'000 m³/h (STP)</td>
</tr>
<tr>
<td>CN, Rudong</td>
<td>2011</td>
<td>Concept</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CN, Xiangyang</td>
<td>2011</td>
<td>Concept</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Start of operation</td>
<td>Anaerobic Digestion</td>
<td>Number of Digester(s)</td>
<td>Net volume per digester</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------</td>
<td>---------------------</td>
<td>-----------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>IT, Belluno</td>
<td>2011</td>
<td>1</td>
<td>1300 m³</td>
<td>Concrete</td>
</tr>
<tr>
<td>DE, Ennigerloh</td>
<td>2011</td>
<td>1</td>
<td>1300 m³</td>
<td>Concrete</td>
</tr>
<tr>
<td>DE, Backnang-Neuschöntal</td>
<td>2011</td>
<td>2</td>
<td>1300 m³</td>
<td>Concrete</td>
</tr>
<tr>
<td>CH, Wauwil</td>
<td>2011</td>
<td>1</td>
<td>1300 m³</td>
<td>Concrete</td>
</tr>
<tr>
<td>CH, Chavornay</td>
<td>2011</td>
<td>1</td>
<td>1500 m³</td>
<td>Steel</td>
</tr>
<tr>
<td>Location</td>
<td>Start of operation</td>
<td>Anaerobic Digestion</td>
<td>Number of Digester(s)</td>
<td>Net volume per digester</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------</td>
<td>---------------------</td>
<td>-----------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td><strong>DE, Ingolstadt</strong></td>
<td>2011</td>
<td></td>
<td>1</td>
<td>1300 m³</td>
</tr>
<tr>
<td><strong>DE, Aurich-Grossefehn</strong></td>
<td>2010</td>
<td></td>
<td>1</td>
<td>1300 m³</td>
</tr>
<tr>
<td><strong>NL, Rijsenhout</strong></td>
<td>2010</td>
<td></td>
<td>2</td>
<td>1300 m³</td>
</tr>
<tr>
<td><strong>CH, Villeneuve</strong></td>
<td>2010</td>
<td></td>
<td>1</td>
<td>1300 m³</td>
</tr>
</tbody>
</table>
### NL, Zwolle

**Start of operation:** 2010  
**Anaerobic Digestion**  
- Number of Digester(s): 2  
- Net volume per digester: 2 m³  
- Digester Design: Concrete  
- Digester Type: PF1300  
- Waste Type: Bio Waste, Green Waste  
- Waste Throughput per Year: 45,000 t/a  
- Biogas Utilisation: Biomethane for gas-grid injection

### LU, Leudelange TABA

**Start of operation:** 2010  
**Combustion**  
- Concept: Water-cooled Grate  
- Fuel: Municipal Solid Waste  
- Number of Lines: 1  
- Throughput per line: 22.00 t/h  
- Thermal power per line: 67.00 MW  
- Boiler Concept: 3-pass boiler  
- Steam: 79 t/h at 40 bar(a) and 400 °C  
- Flue gas treatment Concept: Entrainment reactor, Fabric Filter, SCR  
- Reactant: Sodium Bicarbonate, Lignite Coke  
- Throughput per line: 136,642 m³/h (STP)  
- Energy recovery Output: Electrical Power

### US, Olmsted L5, MN

**Start of operation:** 2010  
**Combustion**  
- Concept: Air-cooled Grate  
- Fuel: Municipal Solid Waste, Waste Oil  
- Number of Lines: 1  
- Throughput per line: 7.93 t/h  
- Thermal power per line: 23.30 MW  
- Boiler Concept: 2-pass boiler  
- Steam: 29 t/h at 44 bar(a) and 346 °C  
- Flue gas treatment Concept: SNCR, Fabric Filter, Spray Dryer  
- Throughput per line: 46,300 m³/h (STP)  
- Energy recovery Output: Electrical Power, Steam

### JP, Yamagata, Gifu

**Start of operation:** 2010  
**Combustion**  
- Fuel: Municipal Solid Waste  
- Number of Lines: 2  
- Throughput per line: 0.75 t/h  
- Boiler Concept: Water Injection  
- Steam:
### NO, Bergen L2
- **Start of operation**: 2010
- **Combustion Concept**: Water-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 1
- **Throughput per line**: 16.00 t/h
- **Thermal power per line**: 44.80 MW
- **Boiler Concept**: 4-pass boiler
- **Steam**: 57 t/h at 43 bar(a) and 402 °C
- **Flue gas treatment Concept**: SNCR, Fabric Filter, Scrubber, Semi-dry System
- **Reactant Reactant**: Caustic Soda, Lignite Coke, Calcium Hydroxide
- **Throughput per line**: 92'000 m³/h (STP)
- **Energy recovery Output**: Hot Water, Electrical Power

### BE, Intradel
- **Start of operation**: 2009
- **Combustion Concept**: Water-cooled Grate
- **Fuel**: Municipal Solid Waste, Sewage Sludge
- **Number of Lines**: 2
- **Throughput per line**: 23.63 t/h
- **Thermal power per line**: 67.10 MW
- **Boiler Concept**: 3-pass boiler with external economizer
- **Steam**: 80 t/h at 40 bar(a) and 400 °C
- **Flue gas treatment Concept**: Electrostatic Precipitator, Ext. Eco, SCR, Spray Absorber
- **Throughput per line**: 141'000 m³/h (STP)

### CN, Chengdu Luodai
- **Start of operation**: 2009
- **Combustion Concept**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 3
- **Throughput per line**: 16.70 t/h
- **Flue gas treatment Concept**: SNCR, Entrainment reactor, Fabric Filter
- **Reactant Reactant**: Activated Carbon, Calcium Hydroxide
- **Throughput per line**: 93'720 m³/h (STP)
- **Energy recovery Output**: Electrical Power

### KR, Iksan
- **Start of operation**: 2009
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 2
- **Throughput per line**: 4.17 t/h
- **Thermal power per line**: 3.90 MW
- **Energy recovery Output**: Electrical Power
**JP, Osaka (Higashiyodo)**

- **Start of operation**: 2009
- **Combustion Concept**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 2
- **Throughput per line**: 8.33 t/h
- **Thermal power per line**: 12.00 MW
- **Energy recovery**: Steam, Electrical Power

**JP, Aira**

- **Start of operation**: 2009
- **Combustion Concept**: Municipal Solid Waste
- **Number of Lines**: 2
- **Throughput per line**: 1.54 t/h
- **Boiler Concept**: Water Injection

**GB, Cleveland L3**

- **Start of operation**: 2009
- **Combustion Concept**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 1
- **Throughput per line**: 19.00 t/h
- **Thermal power per line**: 45.80 MW
- **Boiler Concept**: 4-pass boiler
- **Steam**: 55 t/h at 43 bar(a) and 400 °C
- **Flue gas treatment Concept**: SNCR, Fabric Filter, Semi-dry System
- **Reactant**: Calcium Hydroxide, Activated Carbon
- **Throughput per line**: 94'600 m³/h (STP)
- **Energy recovery Concept**: Condensation Turbine
- **Electric power output**: 10.00 MW (gross)
- **Output**: Electrical Power

**AT, Zistersdorf**

- **Start of operation**: 2009
- **Combustion Concept**: Water-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 1
- **Throughput per line**: 19.79 t/h
- **Thermal power per line**: 57.80 MW
- **Boiler Concept**: 4-pass boiler
- **Steam**: 68 t/h at 42 bar(a) and 405 °C
- **Flue gas treatment Concept**: Entrainment reactor, Fabric Filter, SCR
- **Reactant**: Sodium Bicarbonate
- **Throughput per line**: 97'000 m³/h (STP)
- **Energy recovery Concept**: Condensation Turbine
- **Electric power output**: 14.90 MW (gross)
- **Output**: Electrical Power
<table>
<thead>
<tr>
<th>Location</th>
<th>Start of operation</th>
<th>Anaerobic Digestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES, Mallorca</td>
<td>2009</td>
<td>Number of Digester(s) 1 Net volume per digester 340 m³ Digestor Design Steel Waste Type Food Waste, Green Waste Waste Throughput per Year 5000 t/a Biogas Utilisation Combined Heat and Power</td>
</tr>
<tr>
<td>CH, Altdorf</td>
<td>2009</td>
<td>Number of Digester(s) 3 Net volume per digester 1300 m³ Digestor Design Concrete Digestor Type PF1300 Waste Type Organic Fraction of Municipal Solid Waste Waste Throughput per Year 54000 t/a Biogas Utilisation Combined Heat and Power</td>
</tr>
<tr>
<td>ES, Botarell</td>
<td>2009</td>
<td>Number of Digester(s) 15 Net volume per digester 1300 m³ Digestor Design Concrete Digestor Type PF1300 Waste Type Green Waste, Organic Fraction of Municipal Solid Waste Waste Throughput per Year 274000 t/a Biogas Utilisation Combined Heat and Power</td>
</tr>
<tr>
<td>QA, Doha</td>
<td>2009</td>
<td>Number of Digester(s) 15 Net volume per digester 1300 m³ Digestor Design Concrete Digestor Type PF1300 Waste Type Green Waste, Organic Fraction of Municipal Solid Waste Waste Throughput per Year 274000 t/a Biogas Utilisation Combined Heat and Power</td>
</tr>
<tr>
<td>Location</td>
<td>Start of operation</td>
<td>Anaerobic Digestion</td>
</tr>
<tr>
<td>----------------</td>
<td>--------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>CH, Oensingen</td>
<td>2009</td>
<td>1</td>
</tr>
<tr>
<td>FR, Saint Lô</td>
<td>2009</td>
<td>2</td>
</tr>
<tr>
<td>CH, Volketswil</td>
<td>2009</td>
<td>1</td>
</tr>
<tr>
<td>FR, Argenteuil L4</td>
<td>2008</td>
<td></td>
</tr>
<tr>
<td>DE, Witzenhausen</td>
<td>2008</td>
<td></td>
</tr>
</tbody>
</table>

**FR, Argenteuil L4**
- Start of operation: 2008
- Combustion: Air-cooled Grate
  - Municipal Solid Waste
- Number of Lines: 1
- Throughput per line: 18.15 t/h
- Thermal power per line: 48.60 MW

**DE, Witzenhausen**
- Start of operation: 2008
- Combustion: Fluidized Bed
  - Refuse Derived Fuel, Pulp Sludge
- Number of Lines: 1
- Throughput per line: 34.92 t/h
- Thermal power per line: 125.3 MW

**Flue gas treatment**
- Concept: SNCR, Semi-dry System, Fabric Filter

**Energy recovery**
- Output: 207'100 m³/h (STP)
  - Steam, Electrical Power
<table>
<thead>
<tr>
<th>Location</th>
<th>Start of operation</th>
<th>Combustion Concept</th>
<th>Fuel</th>
<th>Number of Lines</th>
<th>Throughput per line</th>
<th>Flue gas treatment Concept</th>
<th>Reactant</th>
<th>Throughput per line</th>
<th>Boiler Concept</th>
<th>Steam</th>
<th>Thermal power per line</th>
<th>Energy recovery Concept</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>JP, Osumi-kimotsuki, Kagoshima Pref.</strong></td>
<td>2008</td>
<td>Fluidized Bed Gasification</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>2.66 t/h</td>
<td>Electrostatic Precipitator (3 Fields), Ext. Eco, Fabric Filter, Fly Ash Treatment, Heat Exchanger, Heat exchanger 2, Heat exchanger 3, Heat exchanger, SCR, Scrubber, PAC Entrainment</td>
<td>Caustic Soda</td>
<td>67'430 m³/h (STP)</td>
<td>4-pass boiler</td>
<td>13 t/h at 40 bar(a) and 380 °C</td>
<td>Steam, Electrical Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CH, Giubiasco</strong></td>
<td>2008</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>4.00 t/h</td>
<td>SNCR, Entrainment reactor, Fabric Filter</td>
<td>Lignite Coke</td>
<td>24'000 m³/h (STP)</td>
<td>2-pass boiler</td>
<td>121 t/h at 107 bar(a) and 400 °C</td>
<td>Steam, Electrical Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FR, Pithiviers</strong></td>
<td>2008</td>
<td>Water-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>1</td>
<td>38.33 t/h</td>
<td>SNCR, Fabric Filter, Ext. Eco, Scrubber</td>
<td>Lye</td>
<td>199'200 m³/h (STP)</td>
<td>2-pass boiler</td>
<td>121 t/h at 107 bar(a) and 400 °C</td>
<td>Steam, Electrical Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NL, Moerdijk L4</strong></td>
<td>2008</td>
<td>Water-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>1</td>
<td>95.80 MW</td>
<td>Back-pressure Turbine</td>
<td>Lye</td>
<td>199'200 m³/h (STP)</td>
<td>2-pass boiler</td>
<td>121 t/h at 107 bar(a) and 400 °C</td>
<td>Steam, Electrical Power</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### CN, Xiamen Garbage Treatment

<table>
<thead>
<tr>
<th>Start of operation</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion Concept Fuel</td>
<td>Air-cooled Grate Municipal Solid Waste</td>
</tr>
<tr>
<td>Number of Lines</td>
<td>2</td>
</tr>
<tr>
<td>Throughput per line</td>
<td>9.00 t/h</td>
</tr>
<tr>
<td>Thermal power per line</td>
<td>14.65 MW</td>
</tr>
<tr>
<td>Boiler Concept Steam</td>
<td>3-pass boiler</td>
</tr>
<tr>
<td>Flue gas treatment Concept Throughput per line</td>
<td>18 t/h at 40 bar(a) and 400 °C Semi-dry System, Fabric Filter</td>
</tr>
<tr>
<td>Energy recovery Output</td>
<td>42'000 m³/h (STP) Electrical Power</td>
</tr>
</tbody>
</table>

### DE, Flörsheim Wicker

<table>
<thead>
<tr>
<th>Start of operation</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaerobic Digestion</td>
<td>3</td>
</tr>
<tr>
<td>Number of Digester(s)</td>
<td>3</td>
</tr>
<tr>
<td>Net volume per digester</td>
<td>1300 m³</td>
</tr>
<tr>
<td>Digester Design</td>
<td>Concrete</td>
</tr>
<tr>
<td>Digester Type</td>
<td>GG20</td>
</tr>
<tr>
<td>Waste Type</td>
<td>Bio Waste, Food Waste, Green Waste</td>
</tr>
<tr>
<td>Waste Throughput per Year</td>
<td>45'000 t/a</td>
</tr>
<tr>
<td>Biogas Utilisation</td>
<td>Combined Heat and Power</td>
</tr>
</tbody>
</table>

### CH, Klingnau

<table>
<thead>
<tr>
<th>Start of operation</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaerobic Digestion</td>
<td>1</td>
</tr>
<tr>
<td>Number of Digester(s)</td>
<td>1</td>
</tr>
<tr>
<td>Net volume per digester</td>
<td>1300 m³</td>
</tr>
<tr>
<td>Digester Design</td>
<td>Concrete</td>
</tr>
<tr>
<td>Digester Type</td>
<td>GG20</td>
</tr>
<tr>
<td>Waste Type</td>
<td>Bio Waste, Food Waste, Green Waste, Liquid Waste</td>
</tr>
<tr>
<td>Waste Throughput per Year</td>
<td>20'000 t/a</td>
</tr>
<tr>
<td>Biogas Utilisation</td>
<td>Combined Heat and Power</td>
</tr>
</tbody>
</table>

### CH, Lavigny

<table>
<thead>
<tr>
<th>Start of operation</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaerobic Digestion</td>
<td>1</td>
</tr>
<tr>
<td>Number of Digester(s)</td>
<td>1</td>
</tr>
<tr>
<td>Net volume per digester</td>
<td>960 m³</td>
</tr>
<tr>
<td>Digester Design</td>
<td>Concrete</td>
</tr>
<tr>
<td>Digester Type</td>
<td>GG16</td>
</tr>
<tr>
<td>Waste Type</td>
<td>Bio Waste, Green Waste</td>
</tr>
<tr>
<td>Waste Throughput per Year</td>
<td>16'000 t/a</td>
</tr>
<tr>
<td>Biogas Utilisation</td>
<td>Biomethane for gas-grid injection</td>
</tr>
</tbody>
</table>
### FR, Montpellier
- **Start of operation**: 2008
- **Anaerobic Digestion**: 8
  - **Number of Digester(s)**: 8
  - **Net volume per digester**: 1300 m³
  - **Digester Design**: Concrete
  - **Digester Type**: PF1300
  - **Waste Type**: Organic Fraction of Municipal Solid Waste
  - **Waste Throughput per Year**: 10000 t/a
  - **Biogas Utilisation**: Combined Heat and Power

### CH, Inwil
- **Start of operation**: 2008
- **Anaerobic Digestion**: 1
  - **Number of Digester(s)**: 1
  - **Net volume per digester**: 960 m³
  - **Digester Design**: Concrete
  - **Digester Type**: GG16
  - **Waste Type**: Bio Waste, Green Waste, Liquid Manure, Liquid Waste, Solid Manure
  - **Waste Throughput per Year**: 16000 t/a
  - **Biogas Utilisation**: Biomethane for gas-grid injection, Combined Heat and Power

### NL, Wilp-Achterhoeck
- **Start of operation**: 2008
- **Anaerobic Digestion**: 4
  - **Number of Digester(s)**: 4
  - **Net volume per digester**: 1300 m³
  - **Digester Design**: Concrete
  - **Digester Type**: PF1300
  - **Waste Type**: Bio Waste, Green Waste, Liquid Waste
  - **Waste Throughput per Year**: 60000 t/a
  - **Biogas Utilisation**: Combined Heat and Power

### JP, Sano, Tochigi Pref.
- **Start of operation**: 2007
- **Combustion**: Fluidized Bed Gasification
  - **Concept**: Municipal Solid Waste
  - **Fuel**: 1
  - **Number of Lines**: 1
  - **Throughput per line**: 5.33 t/h
<table>
<thead>
<tr>
<th>Plant Location</th>
<th>Start of operation</th>
<th>Combustion Concept</th>
<th>Fuel</th>
<th>Number of Lines</th>
<th>Throughput per line</th>
<th>Thermal power per line</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO, Trondheim L3</td>
<td>2007</td>
<td>Water-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>1</td>
<td>17.29 t/h</td>
<td>45.80 MW</td>
</tr>
<tr>
<td>JP, Toyota, Aichi Pref.</td>
<td>2007</td>
<td>Fluidized Bed Gasification</td>
<td>Municipal Solid Waste</td>
<td>3</td>
<td>5.63 t/h</td>
<td></td>
</tr>
<tr>
<td>FR, Dunkerque</td>
<td>2007</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>1</td>
<td>5.63 t/h</td>
<td>29.30 MW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Boiler Concept</th>
<th>Steam</th>
<th>2-pass boiler</th>
<th>911 t/h at 16 bar(a) and 180 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flue gas treatment Concept</td>
<td>SCR, Scrubber</td>
<td>Caustic Soda</td>
<td></td>
</tr>
<tr>
<td>Scrubber Reactant</td>
<td>Caustic Soda</td>
<td>Lignite Coke</td>
<td></td>
</tr>
<tr>
<td>Throughput per line</td>
<td>50,000 m³/h (STP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy recovery Concept</td>
<td>Condensation Turbine</td>
<td>Electronical Power</td>
<td></td>
</tr>
<tr>
<td>Electric power output</td>
<td>6.00 MW (gross)</td>
<td>Electrical Power</td>
<td></td>
</tr>
</tbody>
</table>
### DE, Stassfurt EVZA
- **Start of operation:** 2007
- **Combustion Concept:** Water-cooled Grate
- **Fuel:** Municipal Solid Waste, Industrial Waste
- **Number of Lines:** 2
- **Throughput per line:** 22.50 t/h
- **Thermal power per line:** 55.60 MW
- **Boiler Concept:** 4-pass boiler
- **Steam:** 64 t/h at 40 bar(a) and 400 °C
- **Flue gas treatment Concept:** SNCR, Semi-dry System, Fabric Filter
- **Throughput per line:** 116'000 m³/h (STP)
- **Energy recovery:** Condensation Turbine
- **Electric power output:** 28.14 MW (gross)

### FR, Issy-les-Moulineaux
- **Start of operation:** 2007
- **Combustion Concept:** Water-cooled Grate
- **Fuel:** Municipal Solid Waste
- **Number of Lines:** 2
- **Throughput per line:** 34.90 t/h
- **Thermal power per line:** 85.23 MW
- **Boiler Concept:** 4-pass boiler
- **Steam:** 104 t/h at 50 bar(a) and 400 °C
- **Flue gas treatment Concept:** Entrainment reactor, Fabric Filter, SCR
- **Reactant:** Sodium Bicarbonate, Lignite Coke
- **Throughput per line:** 151'000 m³/h (STP)
- **Energy recovery:** Condensation Turbine
- **Output:** Electrical Power, Hot Water

### DE, Bamberg L1 - L3
- **Start of operation:** 2007
- **Combustion Concept:** Air-cooled Grate
- **Fuel:** Municipal Solid Waste, Industrial Waste, Sewage Sludge
- **Number of Lines:** 3
- **Throughput per line:** 6.00 t/h
- **Thermal power per line:** 17.50 MW
- **Boiler Concept:** 5-pass boiler
- **Steam:** 20 t/h at 40 bar(a) and 400 °C
- **Energy recovery:** Condensation Turbine
- **Output:** Hot Water

### JP, Kitashiribeshi, Hokkaido
- **Start of operation:** 2007
- **Combustion Concept:** Air-cooled Grate
- **Fuel:** Municipal Solid Waste
- **Number of Lines:** 2
- **Throughput per line:** 4.10 t/h
- **Thermal power per line:** 2.00 MW
- **Energy recovery:** Condensation Turbine
- **Output:** Electrical Power
### DE, Amtzell
- **Start of operation**: 2007
- **Anaerobic Digestion**
- **Number of Digesters(s)**: 1
- **Net volume per digester**: 1300 m³
- **Digester Design**: Concrete
- **Digester Type**: GG20
- **Waste Type**: Bio Waste, Green Waste
- **Waste Throughput per Year**: 18000 t/a
- **Biogas Utilisation**: Combined Heat and Power

### DE, Gröbern
- **Start of operation**: 2007
- **Anaerobic Digestion**
- **Number of Digesters(s)**: 2
- **Net volume per digester**: 1300 m³
- **Digester Design**: Concrete
- **Digester Type**: GG20
- **Waste Type**: Energy Crops
- **Waste Throughput per Year**: 17000 t/a
- **Biogas Utilisation**: Combined Heat and Power

### DE, Ilbenstadt
- **Start of operation**: 2007
- **Anaerobic Digestion**
- **Number of Digesters(s)**: 1
- **Net volume per digester**: 1300 m³
- **Digester Design**: Concrete
- **Digester Type**: GG20
- **Waste Type**: Bio Waste, Green Waste
- **Waste Throughput per Year**: 18250 t/a
- **Biogas Utilisation**: Combined Heat and Power

### CH, Oetwil am See 2
- **Start of operation**: 2007
- **Anaerobic Digestion**
- **Number of Digesters(s)**: 1
- **Net volume per digester**: 340 m³
- **Digester Design**: Steel
- **Waste Type**: Bio Waste, Food Waste, Green Waste
- **Waste Throughput per Year**: 5000 t/a
- **Biogas Utilisation**: Combined Heat and Power

### DE, Regen
- **Start of operation**: 2007
- **Anaerobic Digestion**
- **Number of Digesters(s)**: 1
- **Net volume per digester**: 1300 m³
- **Digester Design**: Concrete
- **Digester Type**: GG20
- **Waste Type**: Bio Waste, Energy Crops, Green Waste
- **Waste Throughput per Year**: 18000 t/a
- **Biogas Utilisation**: Combined Heat and Power
### DE, Rostock

- **Start of operation**: 2007
- **Anaerobic Digestion**
  - Number of Digester(s): 3
  - Net volume per digester: 1300 m³
  - Digester Design: Concrete
  - Digester Type: RM18
  - Waste Type: Organic Fraction of Municipal Solid Waste
  - Waste Throughput per Year: 40000 t/a
  - Biogas Utilisation: Combined Heat and Power

### CH, Utzenstorf

- **Start of operation**: 2007
- **Anaerobic Digestion**
  - Number of Digester(s): 1
  - Net volume per digester: 720 m³
  - Digester Design: Concrete
  - Digester Type: GG12
  - Waste Type: Bio Waste, Green Waste, Liquid Waste
  - Waste Throughput per Year: 12000 t/a
  - Biogas Utilisation: Biomethane for gas-grid injection, Combined Heat and Power

### FR, Sète

- **Start of operation**: 2006
- **Flue gas treatment**
  - Concept: Entrainment reactor, Fabric Filter
  - Number of Lines: 1
  - Fuel: Municipal Solid Waste
  - Reactant: Sodium Bicarbonate
  - Throughput per line: 30'000 m³/h (STP)

### JP, Ariake, Kumamoto Pref.

- **Start of operation**: 2006
- **Combustion**
  - Concept: Fluidized Bed Gasification
  - Fuel: Municipal Solid Waste
  - Number of Lines: 2
  - Throughput per line: 1.04 t/h
  - Boiler Concept: Water Injection
<table>
<thead>
<tr>
<th>Location</th>
<th>Start of operation</th>
<th>Combustion Concept</th>
<th>Combustion Fuel</th>
<th>Number of Lines</th>
<th>Throughput per line</th>
<th>Thermal power per line</th>
<th>Boiler Concept</th>
<th>Steam</th>
<th>Flue gas treatment Concept</th>
<th>Flue gas treatment Reactant</th>
<th>Energy recovery Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH, Lausanne (Tridel)</td>
<td>2006</td>
<td>Water-cooled Grate</td>
<td>Municipal Solid Waste, Hospital Waste</td>
<td>2</td>
<td>12.50 t/h</td>
<td>40.00 MW</td>
<td>4-pass boiler with external economizer</td>
<td>46 t/h at 52 bar(a) and 403 °C</td>
<td>Electrostatic Precipitator (2 Fields), Ext. Eco, Fly Ash Treatment, Heat Exchanger, Heat exchanger 2, Heat exchanger 2, Heat exchanger 3, Heat exchanger, SCR, Scrubber</td>
<td>Scrubber Reactant</td>
<td>63'200 m³/h (STP)</td>
</tr>
<tr>
<td>JP, Tamura, Fukushima</td>
<td>2006</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>1</td>
<td>1.60 t/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Casitca Soda</td>
<td>Hot Water, Electrical Power</td>
</tr>
<tr>
<td>JP, Tokyo (Shinagawa)</td>
<td>2006</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>12.50 t/h</td>
<td>15.00 MW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hot Water, Electrical Power</td>
</tr>
<tr>
<td>JP, Jonan Haseyama II</td>
<td>2006</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>5.00 t/h</td>
<td>4.90 MW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Electrical Power</td>
</tr>
</tbody>
</table>
DE, Erfurt

Start of operation: 2006
Combustion Concept: Municipal Solid Waste, Refuse Derived Fuel
Number of Lines: 1
Throughput per line: 9.75 t/h
Thermal power per line: 26.00 MW
Boiler Concept: Water-cooled Grate
Steam: 3-pass boiler
29 t/h at 40 bar(a) and 400 °C
Flue gas treatment Concept: SNCR, Fabric Filter, Semi-dry System
Reactant: Calcium Hydroxide, Lignite Coke
Throughput per line: 54'000 m³/h (STP)
Energy recovery Concept: Condensation Turbine
Electric power output: 4.90 MW (gross)
Output: Steam, Hot Water, Electrical Power

CH, Aarberg

Start of operation: 2006
Anaerobic Digestion Number of Digester(s): 1
Net volume per digester: 1300 m³
Digestor Design: Concrete
Type: GG20
Waste Type: Bio Waste, Food Waste, Green Waste
Waste Throughput per Year: 20000 t/a
Biogas Utilisation: Combined Heat and Power

CH, Langenthal

Start of operation: 2006
Anaerobic Digestion Number of Digester(s): 1
Net volume per digester: 240 m³
Digestor Design: Steel
Type: Bio Waste, Green Waste
Waste Throughput per Year: 5600 t/a
Biogas Utilisation: Combined Heat and Power

CH, Ottenbach

Start of operation: 2006
Anaerobic Digestion Number of Digester(s): 1
Net volume per digester: 960 m³
Digestor Design: Concrete
Type: GG16
Waste Type: Bio Waste, Food Waste, Green Waste
Waste Throughput per Year: 16000 t/a
Biogas Utilisation: Combined Heat and Power
<table>
<thead>
<tr>
<th>Location</th>
<th>Start of operation</th>
<th>Anaerobic Digestion</th>
<th>Number of Digester(s)</th>
<th>Net volume per digester</th>
<th>Digester Design</th>
<th>Digester Type</th>
<th>Waste Type</th>
<th>Waste Throughput per Year</th>
<th>Biogas Utilisation</th>
<th>Waste Type</th>
<th>Biogas Utilisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH, Pratteln</td>
<td>2006</td>
<td>1</td>
<td>960 m³</td>
<td>Concrete</td>
<td>GG16</td>
<td>Bio Waste, Food Waste, Green Waste</td>
<td>15000 t/a</td>
<td>Biomethane for gas-grid injection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DE, Reimlingen</td>
<td>2006</td>
<td>2</td>
<td>1300 m³</td>
<td>Concrete</td>
<td>GG20</td>
<td>Energy Crops</td>
<td>27000 t/a</td>
<td>Combined Heat and Power</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DE, Weissenfels 2</td>
<td>2006</td>
<td>1</td>
<td>960 m³</td>
<td>Concrete</td>
<td>GG16</td>
<td>Bio Waste, Crop Residues</td>
<td>14500 t/a</td>
<td>Combined Heat and Power</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR, Nantes Valorena</td>
<td>2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JP, Kashiwa, Chiba</td>
<td>2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
KR, Incheon South
Start of operation: 2005
Combustion: Concept
Fuel: Municipal Solid Waste
Number of Lines: 2
Throughput per line: 10.42 t/h
Energy recovery: Output
Energy recovery: Steam

JP, Odate, Akita
Start of operation: 2005
Combustion: Concept
Fuel: Municipal Solid Waste
Number of Lines: 2
Throughput per line: 1.88 t/h
Boiler: Concept
Steam: Water Injection
Energy recovery: Output
Energy recovery: Hot Water

TW, Yunlin
Start of operation: 2005
Combustion: Concept
Fuel: Municipal Solid Waste
Number of Lines: 2
Throughput per line: 12.50 t/h
Thermal power per line: 15.80 MW
Energy recovery: Output
Thermal power per line: Electrical Power

DE, Ludwigslust
Start of operation: 2005
Combustion: Concept
Fuel: Municipal Solid Waste
Number of Lines: 1
Throughput per line: 6.00 t/h
Thermal power per line: 16.00 MW
Boiler: Concept
Steam: 3-pass boiler
Flue gas treatment: SNCR, Fabric Filter, Semi-dry System
Reactant: Calcium Hydroxide, Lignite Coke
Throughput per line: 34'000 m³/h (STP)
Energy recovery: Concept
Electric power output: 3.00 MW (gross)
Output: Electrical Power
DE, Zorbau
Start of operation: 2005
Combustion Concept: Water-cooled Grate
Fuel: Municipal Solid Waste
Number of Lines: 2
Throughput per line: 21.00 t/h
Thermal power per line: 53.60 MW
Boiler Concept: 3-pass boiler
Steam: 63 t/h at 40 bar(a) and 400 °C
Flue gas treatment Concept: SNCR, Semi-dry System, Fabric Filter
Throughput per line: 118'000 m³/h (STP)
Energy recovery Concept: Condensation Turbine
Output: 28.30 MW (gross)

US, Corn Plus, Winnebago, MN
Start of operation: 2005
Combustion Concept: Fluidized Bed
Fuel: Corn Syrup
Number of Lines: 1
Throughput per line: 22.70 t/h
Thermal power per line: 38.00 MW
Flue gas treatment Concept: Entrainment reactor, Fabric Filter
Energy recovery Concept: Steam

US, Hampton Roads, VA
Start of operation: 2005
Combustion Concept: Fluidized Bed
Fuel: Sewage Sludge
Number of Lines: 1
Throughput per line: 1.10 t/h
Thermal power per line: 2.60 MW
Flue gas treatment Concept: Scrubber
Throughput per line: 23'000 m³/h (STP)

SE, Uppsala (Block 5)
Start of operation: 2005
Combustion Concept: Water-cooled Grate
Fuel: Municipal Solid Waste
Number of Lines: 1
Throughput per line: 26.40 t/h
Thermal power per line: 73.33 MW
Boiler Concept: 4-pass boiler
Steam: 100 t/h at 20 bar(a) and 212 °C
Flue gas treatment Concept: Electrostatic Precipitator (2 Fields), Scrubber, Fabric Filter, SCR Lye
Throughput per line: 148'900 m³/h (STP)
Energy recovery Concept: Steam, Hot Water
### FR, Rennes L1+L2
- **Start of operation**: 2005
- **Flue gas treatment Concept**: Semi-dry System, Fabric Filter, SCR
- **Number of Lines**: 2
- **Fuel**: Municipal Solid Waste
- **Throughput per line**: 40,400 m³/h (STP)
- **Energy recovery Output**: Steam, Electrical Power

### FR, Rennes L3
- **Start of operation**: 2005
- **Flue gas treatment Concept**: Semi-dry System, Fabric Filter, SCR
- **Number of Lines**: 1
- **Fuel**: Municipal Solid Waste
- **Throughput per line**: 61,900 m³/h (STP)
- **Energy recovery Output**: Steam, Electrical Power

### CH, Jona
- **Start of operation**: 2005
- **Anaerobic Digestion**: 1 digester
- **Net volume per digester**: 330 m³
- **Digester Design**: Concrete
- **Digester Type**: ZAFE
- **Waste Type**: Bio Waste, Food Waste, Green Waste
- **Waste Throughput per Year**: 5000 t/a
- **Biogas Utilisation**: Combined Heat and Power

### ES, La Rioja
- **Start of operation**: 2005
- **Anaerobic Digestion**: 6 digesters
- **Net volume per digester**: 1050 m³
- **Digester Design**: Concrete
- **Digester Type**: ZAFB
- **Waste Type**: Organic Fraction of Municipal Solid Waste
- **Waste Throughput per Year**: 75000 t/a
- **Biogas Utilisation**: Combined Heat and Power

### CH, Lenzburg
- **Start of operation**: 2005
- **Anaerobic Digestion**: 1 digester
- **Net volume per digester**: 340 m³
- **Digester Design**: Steel
- **Waste Type**: Bio Waste, Food Waste, Green Waste, Liquid Waste
- **Waste Throughput per Year**: 5000 t/a
- **Biogas Utilisation**: Combined Heat and Power
### MQ, Martinique
- **Start of operation**: 2005
- **Anaerobic Digestion**
  - Number of Digester(s): 1
  - Net volume per digester: 750 m³
  - Digester Design: Steel
  - Waste Type: Bio Waste, Green Waste
  - Waste Throughput per Year: 20000 t/a
  - Biogas Utilisation: Combined Heat and Power

### CH, Uzwil 2
- **Start of operation**: 2005
- **Anaerobic Digestion**
  - Number of Digester(s): 1
  - Net volume per digester: 1300 m³
  - Digester Design: Concrete
  - Digester Type: ZAFB
  - Waste Throughput per Year: 20000 t/a
  - Biogas Utilisation: Combined Heat and Power

### DE, TREA Breisgau
- **Start of operation**: 2004
- **Combustion**
  - Concept: Water-cooled Grate
  - Fuel: Municipal Solid Waste
  - Number of Lines: 1
  - Throughput per line: 22.00 t/h
  - Thermal power per line: 61.10 MW
  - Boiler Concept: 3-pass boiler with external economizer
  - Steam: 74 t/h at 40 bar(a) and 400 °C
  - Flue gas treatment Concept: Electrostatic Precipitator (2 Fields), SCR, Semi-dry System, Fabric Filter, Scrubber
  - Scrubber Reactant: Lye
  - Throughput per line: 116'000 m³/h (STP)

### JP, Takamatsu, Kagawa Pref.
- **Start of operation**: 2004
- **Combustion**
  - Concept: Fluidized Bed Gasification
  - Fuel: Municipal Solid Waste
  - Number of Lines: 3
  - Throughput per line: 4.17 t/h
NL, Alkmaar L4
Start of operation: 2004
Combustion Concept: Water-cooled Grate
Fuel: Municipal Solid Waste
Number of Lines: 1
Throughput per line: 27.50 t/h
Thermal power per line: 75.00 MW
Boiler Concept: 4-pass boiler with external economizer
Steam: 89 t/h at 42 bar (a) and 405 °C
Flue gas treatment Concept: Electrostatic Precipitator (2 Fields), Electrostatic Precipitator (3 Fields), SCR, Scrubber
Scrubber Reactant: Caustic Soda, Activated Carbon
Throughput per line: 155'900 m³/h (STP)
Energy recovery Output: Electrical Power

US, MCES, St. Paul, MN
Start of operation: 2004
Combustion Concept: Fluidized Bed
Fuel: Sewage Sludge
Number of Lines: 3
Throughput per line: 4.00 t/h
Thermal power per line: 9.40 MW
Flue gas treatment Concept: SNCR, Fabric Filter, Scrubber
Scrubber Reactant: Lye
Throughput per line: 40'190 m³/h (STP)
Energy recovery Output: Steam

TW, Taitung
Start of operation: 2004
Combustion Concept: Air-cooled Grate
Fuel: Municipal Solid Waste
Number of Lines: 2
Throughput per line: 6.25 t/h
Energy recovery Output: Electrical Power

JP, Kyoto 1
Start of operation: 2004
Anaerobic Digestion Number of Digester(s): 2
Net volume per digester: 1150 m³
Digester Design: Steel
Waste Type: Bio Waste, Food Waste
Waste Throughput per Year: 15000 t/a
Biogas Utilisation: Combined Heat and Power
### DE, Passau

- **Start of operation**: 2004
- **Anaerobic Digestion**
  - Number of Digester(s): 3
  - Net volume per digester: 980 m³
  - Digester Design: Concrete
  - Digester Type: ZAFB
  - Waste Type: Bio Waste, Green Waste
  - Waste Throughput per Year: 39,000 t/a
  - Biogas Utilisation: Combined Heat and Power

### CH, Thun

- **Start of operation**: 2003
- **Combustion**
  - Concept: Water-cooled Grate
  - Fuel: Municipal Solid Waste, Sewage Sludge
  - Number of Lines: 1
  - Throughput per line: 18.40 t/h
  - Thermal power per line: 46.00 MW
  - Boiler Concept: 4-pass boiler with external economizer
    - Steam: 55 t/h at 40 bar (a) and 400 °C
  - Scrubber Reactant: Lye
  - Throughput per line: 78,000 m³/h (STP)

### FR, Poitiers

- **Start of operation**: 2003
- **Combustion**
  - Concept: Air-cooled Grate
  - Fuel: Municipal Solid Waste
  - Number of Lines: 2
  - Throughput per line: 3.30 t/h

### FR, Evreux

- **Start of operation**: 2003
- **Combustion**
  - Concept: Air-cooled Grate
  - Fuel: Municipal Solid Waste, Sewage Sludge
  - Number of Lines: 2
  - Throughput per line: 5.63 t/h
  - Thermal power per line: 14.40 MW
  - Boiler Concept: 2-pass boiler
    - Steam: 17 t/h at 40 bar (a) and 380 °C
  - Flue gas treatment Concept: Fabric Filter, SCR, Semi-dry System
    - Reactant: Sodium Bicarbonate, Lignite Coke
    - Throughput per line: 31,000 m³/h (STP)
  - Energy recovery Concept: Back-pressure Turbine
    - Electric power output: 6.00 MW (gross)
    - Output: Electrical Power
**JP, Ishikawahokubu, Ishikawa Pref.**
- **Start of operation:** 2003
- **Combustion Concept:** Fluidized Bed Gasification
- **Fuel:**
- **Number of Lines:** 2
- **Throughput per line:** 3.33 t/h

**JP, Fukue, Nagasaki Pref**
- **Start of operation:** 2003
- **Combustion Concept:** Fluidized Bed Gasification
- **Fuel:**
- **Number of Lines:** 2
- **Throughput per line:** 1.20 t/h

**FR, Perpignan**
- **Start of operation:** 2003
- **Combustion Concept:** Air-cooled Grate
- **Municipal Solid Waste:**
- **Number of Lines:** 2
- **Throughput per line:** 12.10 t/h
- **Thermal power per line:** 32.40 MW
- **Boiler Concept:** 4-pass boiler
- **Steam:**
- **Throughput per line:** 35 t/h at 40 bar(a) and 380 °C
- **Flue gas treatment Concept:** SNCR, Semi-dry System, Fabric Filter
- **Throughput per line:** 61'000 m³/h (STP)
- **Energy recovery Concept:** Condensation Turbine
- **Electric power output:** 21.00 MW (gross)
- **Output:** Electrical Power

**US, WWTP Lynn, MA**
- **Start of operation:** 2003
- **Combustion Concept:** Fluidized Bed
- **Sewage Sludge:**
- **Number of Lines:** 1
- **Throughput per line:** 1.07 t/h
- **Thermal power per line:** 2.10 MW
- **Flue gas treatment Concept:** Scrubber, Electrostatic Precipitator
- **Throughput per line:** 40'100 m³/h (STP)
<table>
<thead>
<tr>
<th>Location</th>
<th>Start of operation</th>
<th>Combustion Concept</th>
<th>Fuel Type</th>
<th>Number of Lines</th>
<th>Throughput per line</th>
<th>Thermal power per line</th>
</tr>
</thead>
<tbody>
<tr>
<td>JP, Touga, Pref Shizuoka</td>
<td>2003</td>
<td>Water-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>1.88 t/h</td>
<td></td>
</tr>
<tr>
<td>IT, Bologna</td>
<td>2003</td>
<td>Water-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>13.75 t/h</td>
<td>44.80 MW</td>
</tr>
<tr>
<td>JP, Niijima, Tokyo Pref.</td>
<td>2003</td>
<td>Water-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>1</td>
<td>1.00 t/h</td>
<td></td>
</tr>
<tr>
<td>CH, Buchs SG L1</td>
<td>2003</td>
<td>Water-cooled Grate</td>
<td>Municipal Solid Waste, Industrial Waste</td>
<td>1</td>
<td>7.20 t/h</td>
<td>22.80 MW</td>
</tr>
</tbody>
</table>
**CH, Bachenbülach 2**

- Start of operation: 2003
- Number of Digester(s): 1
- Net volume per digester: 340 m³
- Waste Type: Bio Waste, Food Waste, Green Waste
- Waste Throughput per Year: 10000 t/a
- Biogas Utilisation: Biomethane for gas-grid injection, Combined Heat and Power

**DE, Weissenfels 1**

- Start of operation: 2003
- Number of Digester(s): 1
- Net volume per digester: 980 m³
- Waste Type: Bio Waste, Green Waste
- Waste Throughput per Year: 12500 t/a

**DE, Bremerhaven Duotherm**

- Start of operation: 2002
- Combustion Concept: Water-cooled Grate
- Fuel: Municipal Solid Waste
- Number of Lines: 1
- Throughput per line: 8.00 t/h
- Thermal power per line: 23.30 MW
- Boiler Concept: 4-pass boiler
- Steam: 27 t/h at 40 bar(a) and 0 °C
- Energy recovery Output: Electrical Power

**JP, Sakurai, Nara Pref.**

- Start of operation: 2002
- Combustion Concept: Fluidized Bed Gasification
- Fuel: Municipal Solid Waste
- Number of Lines: 2
- Throughput per line: 3.12 t/h
### FR, Le Mans L2bis

<table>
<thead>
<tr>
<th>Start of operation</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion Concept</td>
<td>Air-cooled Grate</td>
</tr>
<tr>
<td>Fuel</td>
<td>Municipal Solid Waste, Hospital Waste</td>
</tr>
<tr>
<td>Number of Lines</td>
<td>1</td>
</tr>
<tr>
<td>Throughput per line</td>
<td>9.00 t/h</td>
</tr>
<tr>
<td>Thermal power per line</td>
<td>24.10 MW</td>
</tr>
<tr>
<td>Boiler Concept</td>
<td>3-pass boiler</td>
</tr>
<tr>
<td>Steam</td>
<td>29 t/h at 30 bar(a) and 350 °C</td>
</tr>
<tr>
<td>Flue gas treatment Concept</td>
<td>Fabric Filter, SCR, Semi-dry System</td>
</tr>
<tr>
<td>Throughput per line</td>
<td>50'000 m³/h (STP)</td>
</tr>
<tr>
<td>Energy recovery</td>
<td>Electrical Power</td>
</tr>
</tbody>
</table>

### JP, Okinoerabu, Kagoshima Pref.

<table>
<thead>
<tr>
<th>Start of operation</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion Concept</td>
<td>Fuel</td>
</tr>
<tr>
<td>Number of Lines</td>
<td>2</td>
</tr>
<tr>
<td>Throughput per line</td>
<td>1.00 t/h</td>
</tr>
<tr>
<td>Boiler Concept</td>
<td>Water Injection</td>
</tr>
<tr>
<td>Steam</td>
<td>Municipal Solid Waste</td>
</tr>
<tr>
<td>Energy recovery</td>
<td>Output</td>
</tr>
</tbody>
</table>

### JP, Nasu, Tochigi Pref.

<table>
<thead>
<tr>
<th>Start of operation</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion Concept</td>
<td>Fuel</td>
</tr>
<tr>
<td>Number of Lines</td>
<td>2</td>
</tr>
<tr>
<td>Throughput per line</td>
<td>2.50 t/h</td>
</tr>
<tr>
<td>Boiler Concept</td>
<td>Water Injection</td>
</tr>
<tr>
<td>Steam</td>
<td>Municipal Solid Waste</td>
</tr>
<tr>
<td>Energy recovery</td>
<td>Output</td>
</tr>
</tbody>
</table>

### CH, KEBAG Emmenspitz L4

<table>
<thead>
<tr>
<th>Start of operation</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion Concept</td>
<td>Water-cooled Grate</td>
</tr>
<tr>
<td>Fuel</td>
<td>Municipal Solid Waste, Industrial Waste, Sewage Sludge</td>
</tr>
<tr>
<td>Number of Lines</td>
<td>1</td>
</tr>
<tr>
<td>Throughput per line</td>
<td>10.00 t/h</td>
</tr>
<tr>
<td>Thermal power per line</td>
<td>28.50 MW</td>
</tr>
<tr>
<td>Boiler Concept</td>
<td>3-pass boiler</td>
</tr>
<tr>
<td>Steam</td>
<td>32 t/h at 38 bar(a) and 385 °C</td>
</tr>
<tr>
<td>Flue gas treatment Concept</td>
<td>SNCR, Fly Ash Treatment, Scrubber, NH4OH-Stripper</td>
</tr>
<tr>
<td>Throughput per line</td>
<td>58'040 m³/h (STP)</td>
</tr>
<tr>
<td>Energy recovery</td>
<td>Electrical Power</td>
</tr>
</tbody>
</table>

**Energy recovery Output:** Steam, Hot Water, Electrical Power
<table>
<thead>
<tr>
<th>Location</th>
<th>Start of operation</th>
<th>Fuel</th>
<th>Number of Lines</th>
<th>Throughput per line</th>
<th>Flue gas treatment</th>
<th>Energy recovery</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>JP, Osaka (Maishima)</strong></td>
<td>2001</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>18.75 t/h</td>
<td>Fabric Filter, Heat Exchanger, SCR, Scrubber</td>
<td>Output</td>
<td>Electrical Power</td>
</tr>
<tr>
<td><strong>JP, Fukuoka Rinkai</strong></td>
<td>2001</td>
<td>Municipal Solid Waste</td>
<td>3</td>
<td>12.50 t/h</td>
<td></td>
<td>Output</td>
<td>Electrical Power</td>
</tr>
<tr>
<td><strong>JP, Nishimurayama, Yamagata Pref.</strong></td>
<td>2001</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>2.08 t/h</td>
<td>Water Injection</td>
<td>Output</td>
<td>Hot Water</td>
</tr>
<tr>
<td><strong>JP, Tokyo (Chuo)</strong></td>
<td>2001</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>12.50 t/h</td>
<td></td>
<td>Output</td>
<td>Hot Water, Electrical Power</td>
</tr>
<tr>
<td><strong>FR, Rouen</strong></td>
<td>2001</td>
<td>Air-cooled Grate</td>
<td>3</td>
<td>14.50 t/h</td>
<td>38.80 MW</td>
<td>Output</td>
<td>Electrical Power</td>
</tr>
</tbody>
</table>

*Note: *Thermal power per line values indicate the energy recovery output as electrical power.*
### DE, Nuremberg L1-L3
- **Start of operation**: 2001
- **Combustion Concept**: Water-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 3
- **Throughput per line**: 10.50 t/h
- **Thermal power per line**: 35.00 MW
- **Boiler Concept**: 4-pass boiler
- **Steam**: 41 t/h at 45 bar(a) and 400 °C
- **Flue gas treatment Concept**: SCR, Scrubber
- **Scrubber Reactant**: Lye
- **Throughput per line**: 64,250 m³/h (STP)
- **Energy recovery Output**: Steam

### FR, Maubeuge
- **Start of operation**: 2001
- **Combustion Concept**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 2
- **Throughput per line**: 5.50 t/h
- **Thermal power per line**: 14.10 MW
- **Boiler Concept**: 4-pass boiler
- **Steam**: 17 t/h at 36 bar(a) and 360 °C
- **Flue gas treatment Concept**: Semi-dry System, Fabric Filter
- **Throughput per line**: 30,500 m³/h (STP)
- **Energy recovery Output**: Steam, Hot Water, Electrical Power

### FR, Salaise L3
- **Start of operation**: 2001
- **Combustion Concept**: Water-cooled Grate
- **Fuel**: Municipal Solid Waste, Industrial Waste
- **Number of Lines**: 1
- **Throughput per line**: 19.00 t/h
- **Thermal power per line**: 48.60 MW
- **Boiler Concept**: 3-pass boiler
- **Steam**: 77 t/h at 42 bar(a) and 350 °C
- **Flue gas treatment Concept**: SNCR, Fabric Filter, Semi-dry System
- **Throughput per line**: 140,000 m³/h (STP)
- **Energy recovery Output**: Steam, Electrical Power

### IT, Trezzo
- **Start of operation**: 2001
- **Combustion Concept**: Water-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 2
- **Throughput per line**: 16.16 t/h
- **Thermal power per line**: 41.20 MW
- **Boiler Concept**: 4-pass boiler
- **Steam**: 49 t/h at 40 bar(a) and 400 °C
- **Flue gas treatment Concept**: SNCR, Fabric Filter, Semi-dry System
- **Throughput per line**: 84,000 m³/h (STP)
- **Energy recovery Output**: Electrical Power
### US, McKay Bay, Tampa, FL
- **Start of operation**: 2001
- **Combustion**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 4
- **Throughput per line**: 9.46 t/h
- **Thermal power per line**: 26.30 MW
- **Boiler Concept**: 2-pass boiler
- **Steam**: 24 t/h at 45 bar(a) and 0 °C

### CH, Oetwil am See 1
- **Start of operation**: 2001
- **Anaerobic Digestion**
  - **Number of Digester(s)**: 1
  - **Net volume per digester**: 750 m³
  - **Digester Design**: Steel
  - **Waste Type**: Bio Waste, Food Waste, Green Waste, Liquid Waste
  - **Waste Throughput per Year**: 10000 t/a
  - **Biogas Utilisation**: Combined Heat and Power

### AT, Roppen
- **Start of operation**: 2001
- **Anaerobic Digestion**
  - **Number of Digester(s)**: 1
  - **Net volume per digester**: 750 m³
  - **Digester Design**: Steel
  - **Waste Type**: Bio Waste, Green Waste
  - **Waste Throughput per Year**: 10000 t/a
  - **Biogas Utilisation**: Combined Heat and Power

### JP, Minamikawachi-2, Osaka Pref.
- **Start of operation**: 2000
- **Combustion**: Water Injection
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 2
- **Throughput per line**: 3.96 t/h
- **Boiler Concept**: Steam

### JP, Hitachi, Ibaraki Pref.
- **Start of operation**: 2000
- **Combustion**: Air-cooled Grate
- **Fuel**: Municipal Solid Waste
- **Number of Lines**: 3
- **Throughput per line**: 4.17 t/h
<table>
<thead>
<tr>
<th>Location</th>
<th>Start of operation</th>
<th>Combustion Concept</th>
<th>Fuel</th>
<th>Number of Lines</th>
<th>Throughput per line</th>
<th>Energy recovery</th>
<th>Output</th>
<th>Output Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>KR, Buchon Daejang-Dong</td>
<td>2000</td>
<td>Municipal Solid Waste</td>
<td>1</td>
<td>12.50 t/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JP, Amagasaki II, Hyogo Pref.</td>
<td>2000</td>
<td>Air-cooled Grate</td>
<td>Municipal Solid Waste</td>
<td>1</td>
<td>6.25 t/h</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JP, Nishikaigan, Aomori Pref.</td>
<td>2000</td>
<td>Fuel</td>
<td>1</td>
<td>2.75 t/h</td>
<td></td>
<td></td>
<td></td>
<td>Water Injection</td>
</tr>
<tr>
<td>TW, Hsichou Changhua</td>
<td>2000</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>18.75 t/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TW, Houli Taichung</td>
<td>2000</td>
<td>Municipal Solid Waste</td>
<td>2</td>
<td>18.75 t/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
by Hitachi Zosen since 2000

<table>
<thead>
<tr>
<th>US, Palo Alto, CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start of operation</td>
</tr>
<tr>
<td>Combustion Concept</td>
</tr>
<tr>
<td>Fuel</td>
</tr>
<tr>
<td>Number of Lines</td>
</tr>
<tr>
<td>Throughput per line</td>
</tr>
<tr>
<td>Flue gas treatment Concept</td>
</tr>
<tr>
<td>Throughput per line</td>
</tr>
</tbody>
</table>