NIPPON STEEL
ENGINEERING

NIPPON STEEL ENGINEERING's

Waste to Energy System

Your most reliable partner for Waste to Energy

NIPPON STEEL ENGINEERING CO., LTD.

NIPPON STEEL ENGINEERING's State of the Art Combustion System

CONCEPT

Stable and Thorough Combustion Sequence

- From high to low calorific values, our system can treat a wide range of waste.
- Highly reliable because of its simple combustion control system, able to adapt to changes to waste properties.
- By creating efficient air cyclones in the secondary combustion zone, less air is required for full combustion.
- Currently holds the record for largest operating plant per line at 864t/d. Our maximum design capacity is at 1,200t/d, which is also the one of largest in the world.

High Energy Generation Efficiency

Various technologies (e.g. High steam condition boiler and regeneration / reheating cycle of steam) allow us to achieve higher power generation efficiency. **R**eference plants are as follows:

- Napoli Plant (based on initial conditions set by client)
  Steam Conditions : 500℃, 90 bar
  Generation Efficiency : 30.2% (Highest in the world)
- Rüdersdorf Plant
  Steam Conditions : 400℃, 90 bar
  Generation Efficiency : 29.9% (Uses Reheating Cycle)

Advanced Flue Gas Cleaning

- We comply with even stricter emission regulations than standard Japanese regulations.
- We provide various treatment methods that fit your flue gas cleaning needs.
- Dioxin is dealt with by destruction through complete combustion of flue gas and removal using activated carbon or further destruction with catalyst.

Easy Maintenance and Long Continuous Operation

- <Furnace> Minimize shutdown to prevent clinker blockage.
- <Grate> Minimize replacement needs by choosing optimum grate type (air or water cooled).
  Simple (bolts and nuts not required) structure allows easy maintenance .
- <Boiler> Maximize lifespan by optimizing temperature settings and equipment design/material.

References

Napoli, Italy (based on initial conditions set by client)

Start of operation	2009
Waste	RDF
Calorific value	15MJ/kg(3,580kcal/kg)
Capacity	658t/d × 3line
Steam condition	90bar 500℃
Amount generated	107MW

NIPPON STEEL ENGINEERING's Standard Spec

Topic	Standard Spec	Comments
Grate Combustion rate	250-360kg/m²h	Depends on waste. Able to conserve space.
Range of calorific value (LHV)	5.0 to 18.0 MJ/kg	Waste of lower and higher values (including RDF) is also acceptable
Acceptance size	Under 600㎜X600㎜X600㎜	Lengths up to 1200㎜ also acceptable
Throughput Capability	50 to 1200t/d	Largest so far is 864t/d(largest in the world)
Flue gas cleaning method	Dry, Semi Dry, Wet	Depends on customer needs
Flue gas type (NOx)	Catalytic, Non-catalytic, Activated Carbon	Depends on customer needs
Start up time	Appx 8 hrs	
Shut down time	Appx 4 hrs	Emergency shutdown available
Energy generation efficiency (max)	26% (30.2%)	Max is world's best.
Availability	8,000hrs (10,000hrs)	7,200~8,000hrs is the global standard
Steam temperature	~400℃ (500℃)	Designed based on LCC preference of customer
Fluctuation of Steam	Below 3%	Important factor for PPA
Utilities	Water, electricity, fuel	Fuel for start-up and shut down
Ignition Loss	Below 3%	Reference around 1~2%

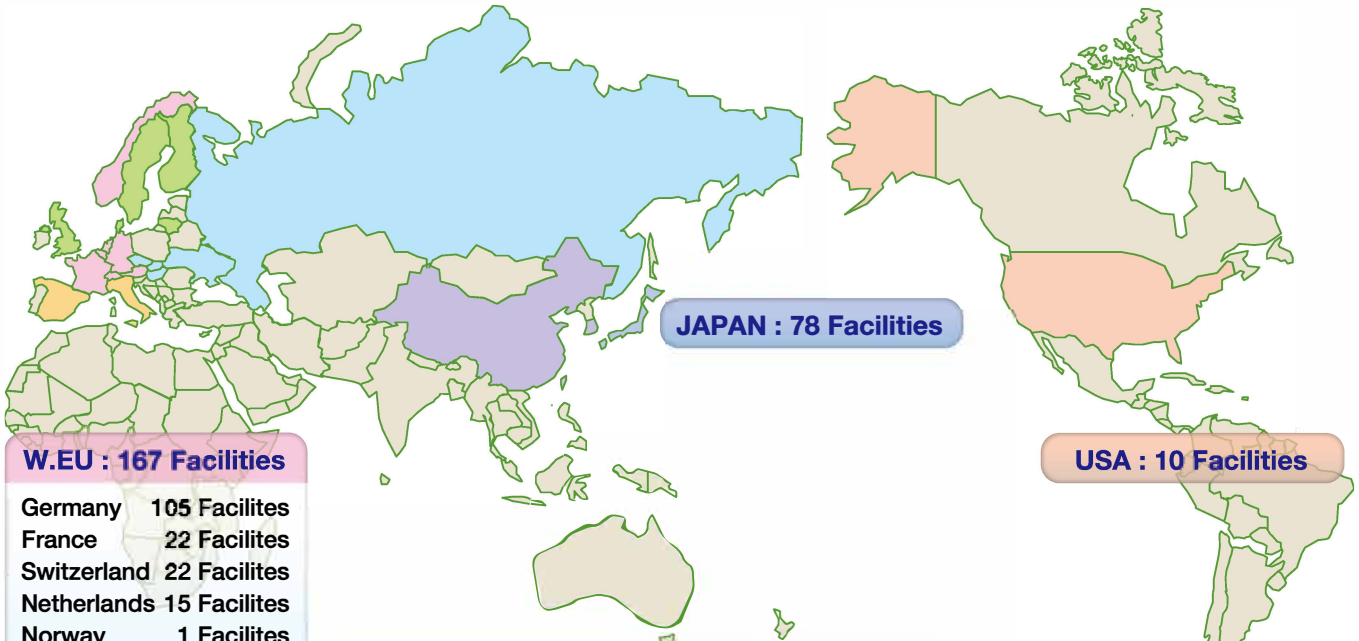
Global Presence in WtE Business

REFERENCES

Combustion: 60years, appx 500 Units= 150 thousand tpd
Gasification: 40years, appx 80 Units= 10 thousand tpd

※Updated in Mar. 2019
※Includes Licensed Projects.

Globally Proven Technology



JAPAN : 78 Facilities

USA : 10 Facilities

W.EU : 167 Facilities

Germany	105 Facilites
France	22 Facilites
Switzerland	22 Facilites
Netherlands	15 Facilites
Norway	1 Facilites
Austria	1 Facilites
Belgium	1 Facilites

S.EU : 18 Facilities

Italy	15 Facilites
Spain	3 Facilites

N.EU : 26 Facilities

UK	10 Facilites
Sweden	8 Facilites
Denmark	3 Facilites
Finland	3 Facilites
Lithuania	2 Facilites

E.EU : 17 Facilities

Russia	9 Facilites
Ukraine	4 Facilites
Slovakia	2 Facilites
Czech	1 Facilites
Hungary	1 Facilites

Asia : 22 Facilities

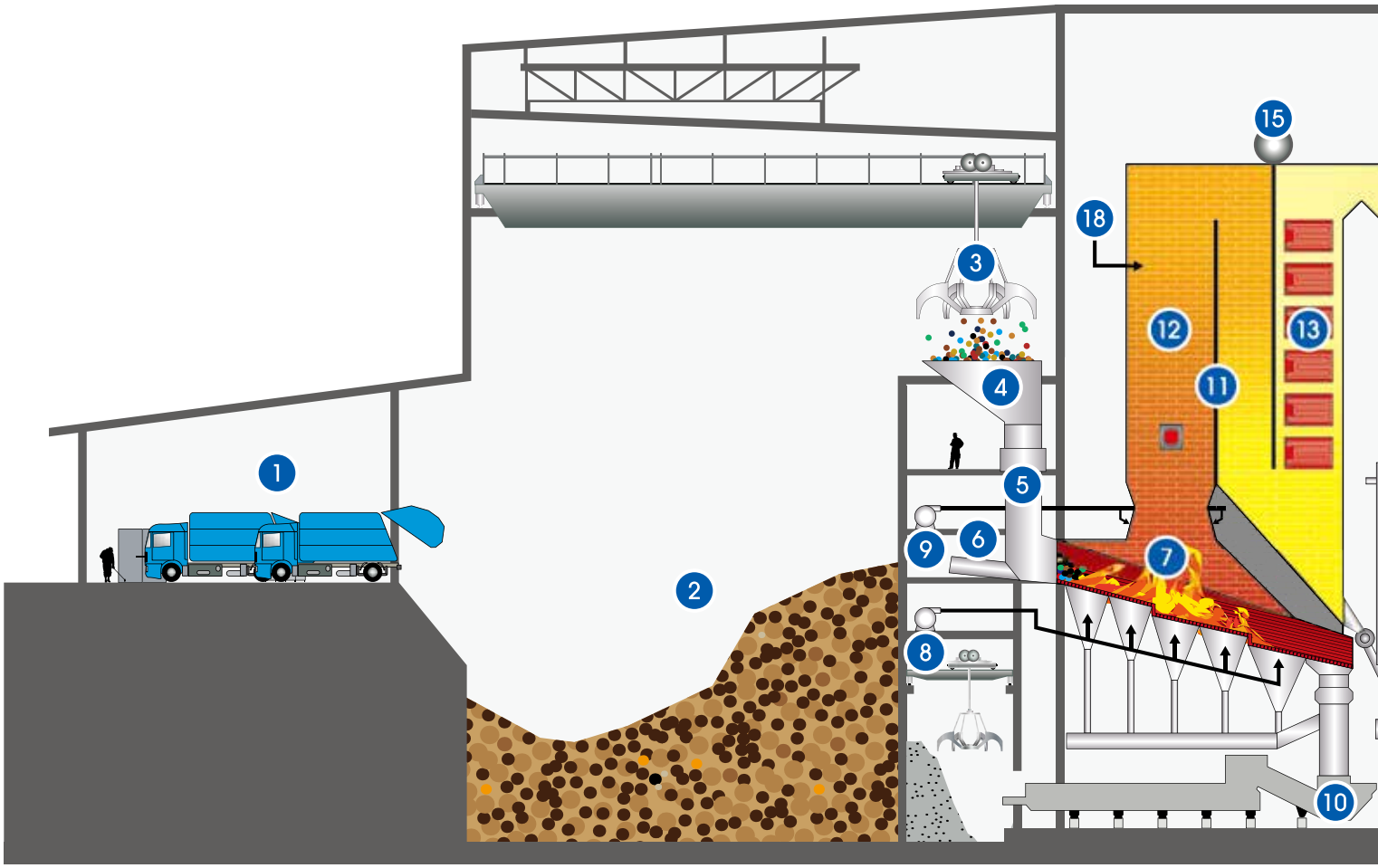
S.Korea	12 Facilites
China	6 Facilites
Singapore	2 Facilites
Taiwan	2 Facilites

References

Rüdersdorf, Germany

Ruhleben, Germany

FLOW



① Platform

② Waste Pit

③ Waste Crane

④ Waste Hopper

⑤ Waste Chute

⑥ Waste Feeder

⑦ Stoker Furnace

The well designed [2 'Steps'] and [Declination Angle] of the furnace allows stable and thorough treatment of a wide range of waste.

⑧ Primary Air Fan

Waste is combusted with air fed into the furnace. The air is designed to also dry incoming waste and cool the grate .

⑨ Secondary Air Fan

A cyclone to effectively and thoroughly combust flue gas within the furnace is created with a low 'excess air ratio'

⑩ Slag extracter

⑪ Boiler

Steam generated with the heat from the combustion of waste. Corrosion of boiler tubes and build-up of clinkers and fouling are prevented through our technology and experience.

⑫ Secondary Combustion Zone

The secondary air helps combustion and maintain the temperature above 900℃ for more than 2 seconds. This prevents Dioxin generation.

⑬ Super heater

⑭ Economizer

⑮ Boiler Drum

⑯ Steam Turbine / Generator

⑰ Low Pressure Steam Condenser

The turbine exhaust steam is condensated and recirculated to the boiler.

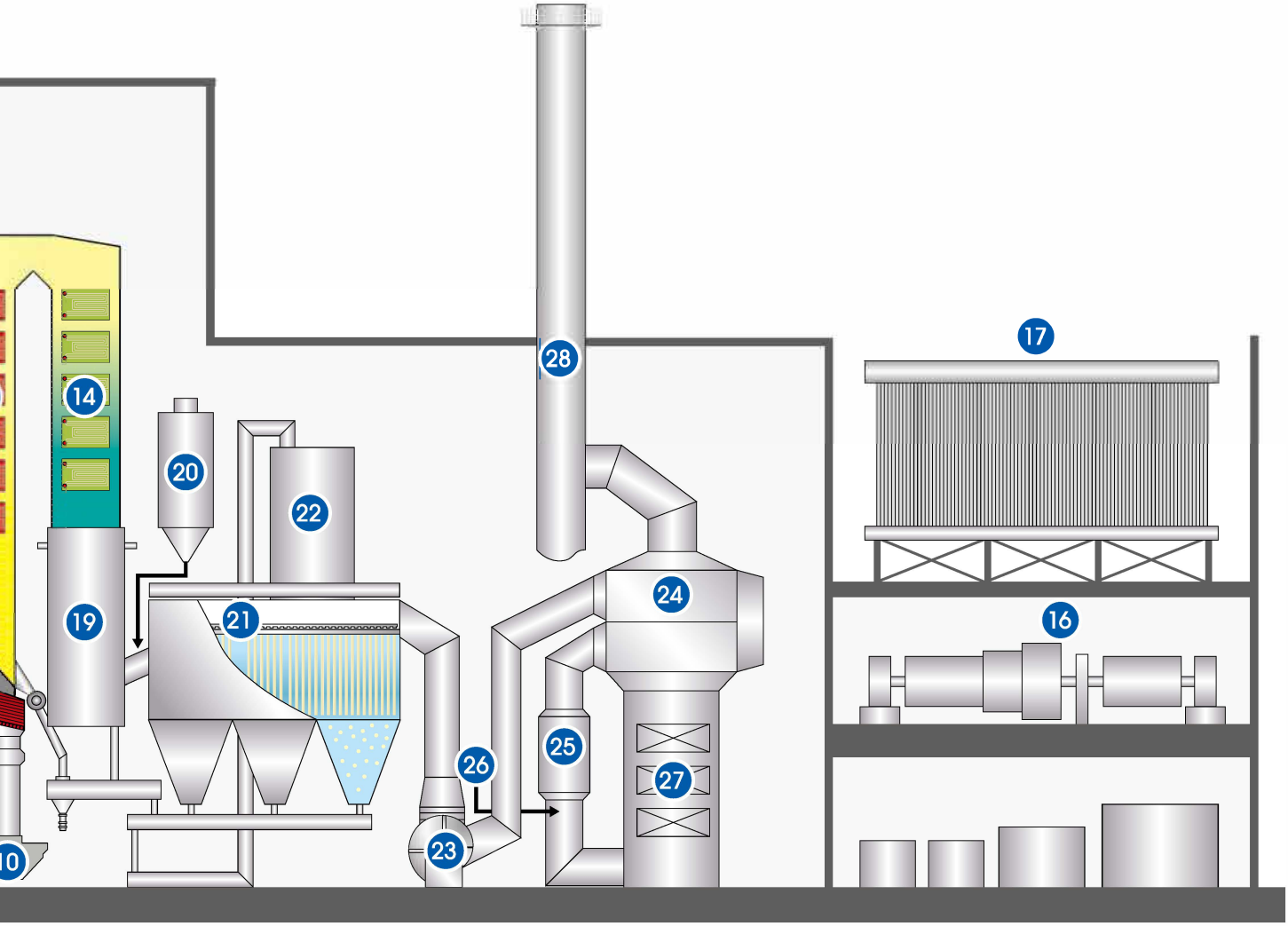
⑱ Ammonia/Urea

If selective non catalytic reduction (SNCR) system is applicated, Ammonia water or urea water is injected into the Secondary Combustion zone to remove NOx.

⑲ Gas Cooler

For additional needs

FLOW



20 **Slaked Lime / Activated Carbon**
Removes HCl, SOx, Heavy metals, and any remaining Dioxins

21 **Bag Filter**

22 **Ash Treatment**

23 **Induced Draft Fan**

24 **Gas to Gas Heat Exchanger**

25 **Flue Gas Reheater**

26 **Ammonia Injection (de-NOx agent)**

27 **Catalytic Reactor (de-NOx and de-Dioxins)**

28 **Stack**

References


Hefei, China


Klaipeda, Lithuania