

Presentation of Japanese technology of waste to energy

JASE-world

Waste to Energy Sub WG

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Introduction of JASE-world

◆ JASE-W established in Oct 2008

◆ Members – Digits in parentheses show numbers of members as of APR 2011

| | |
|----------------------------|---|
| Corporate(72) | Steel(2), Power & Gas Supply(8), Finance(5), Trading(7), Manufacturer - General(18), Electric(7), Electronic(3), Ceramic(1), Rubber(3) - Housing(2), Construction(1), Petroleum(1), Car(1), Petrochemicals(3), Engineering(10), |
| Industrial Association(20) | |
| Observer(12) | METI , MOFA, JETRO, NEDO, JBIC, JICA, WB, ADB, NEXI, IFC, IEEJ, Clean Association of Tokyo 23 |



Mr. H Yonekura, Chairman of JASE-W
(Chairman of Japan Business Federation)

◆ Activities

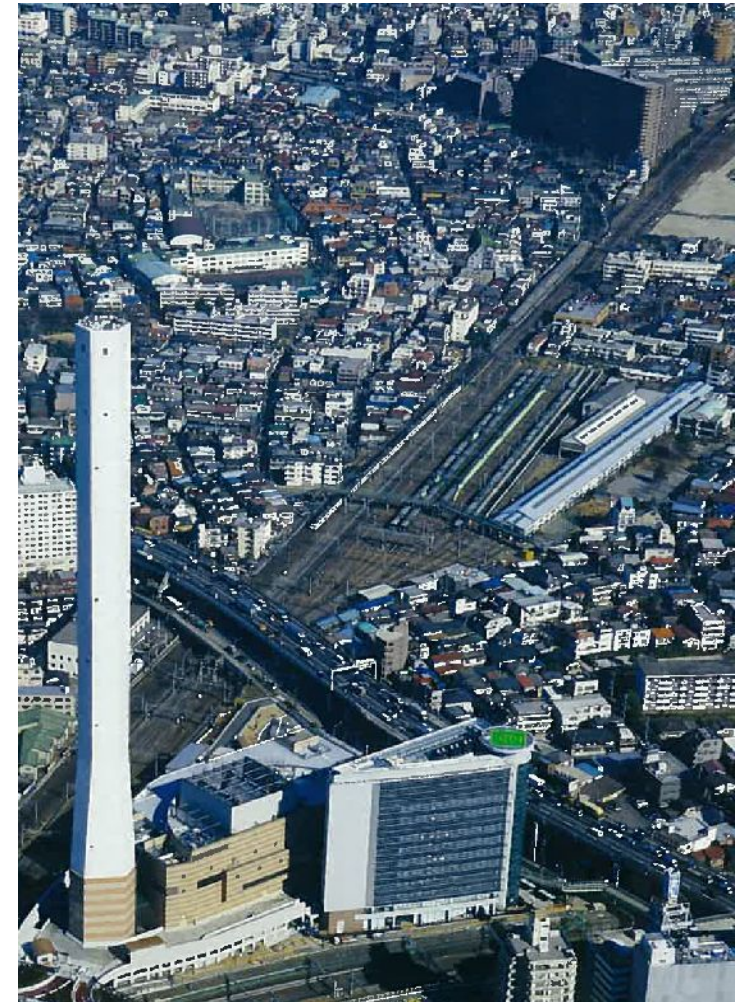
- Policy Proposal to Government
- Project Exploration through 4 Working Groups(WG) associated with G&B Mission Overseas
- Publication of Japanese Smart Energy Technologies
- PR through International & Domestic Expositions
- News Release by Website and Advertise on News Paper

**Japanese Business
Alliance for
Smart
Energy
- Worldwide**



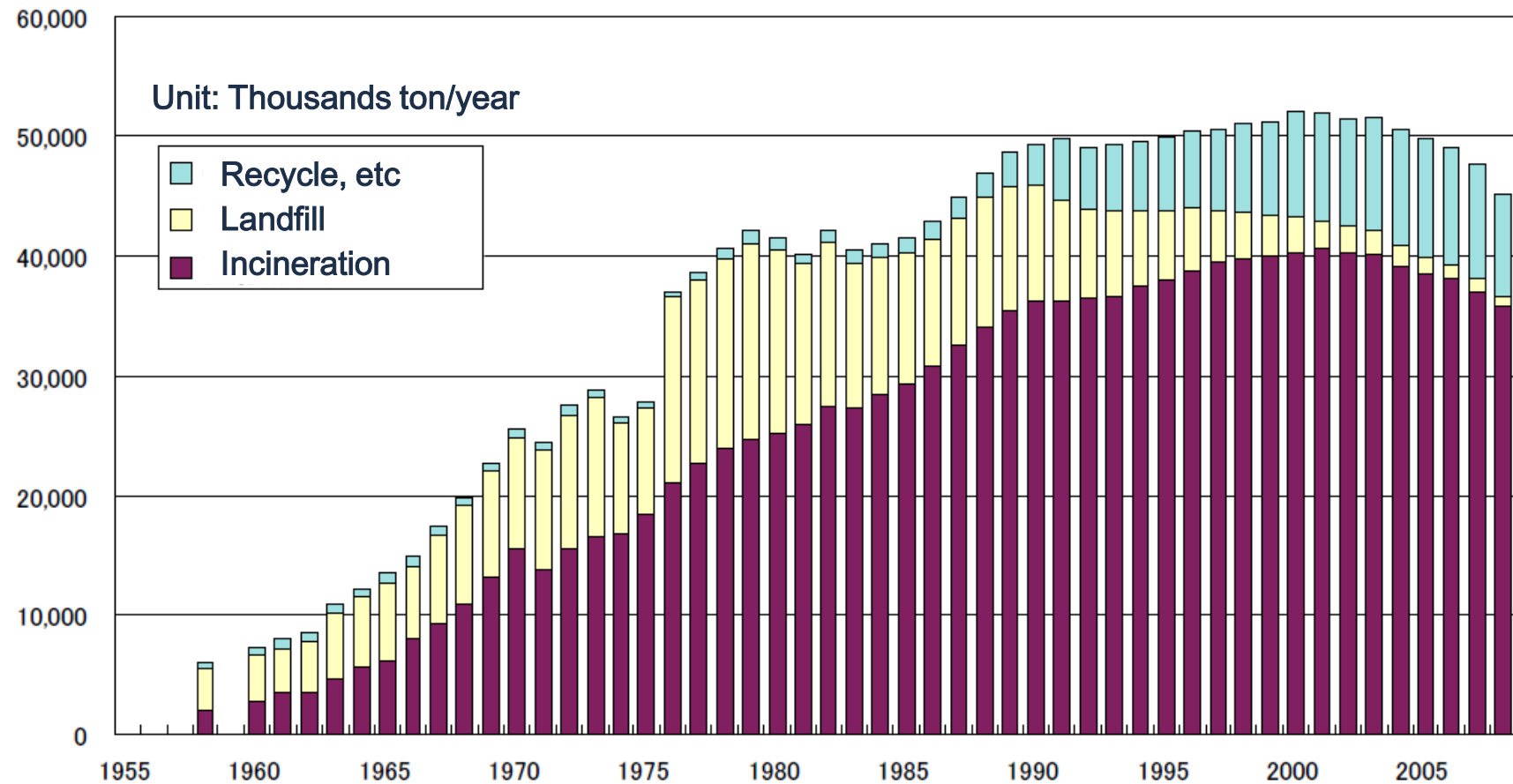
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Introduction of Waste and Resources in Tokyo



Waste Treatment Transition in Japan(1990-2008)

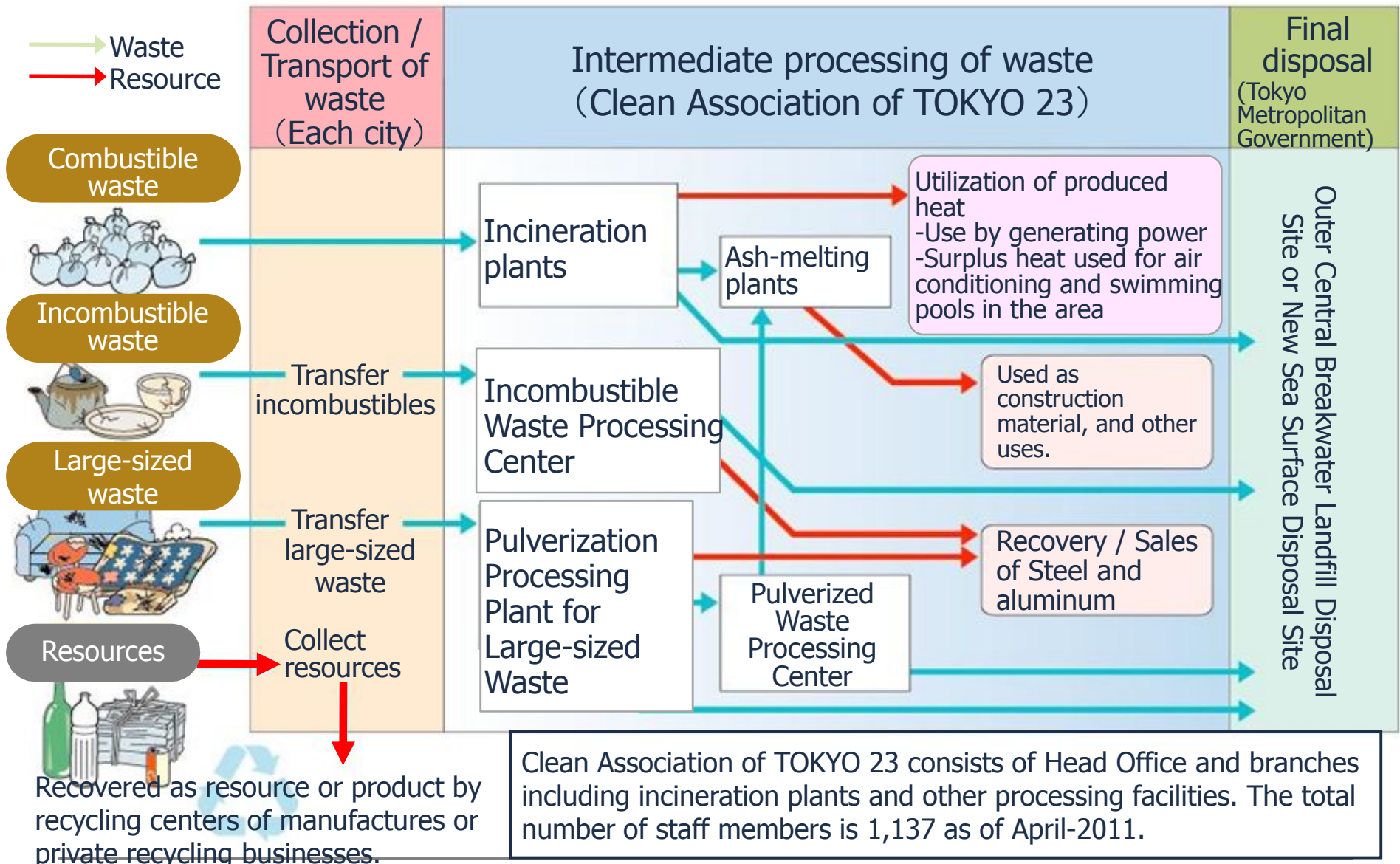
Incineration is common in Japan due to the limited habitable land and pressure of waste volume reduction



Source: 3R Forum



Flow of waste and resources in Tokyo 23 cities



From Clean Association of TOKYO 23



Suginami Plant (left) & Toshima Plant (right)

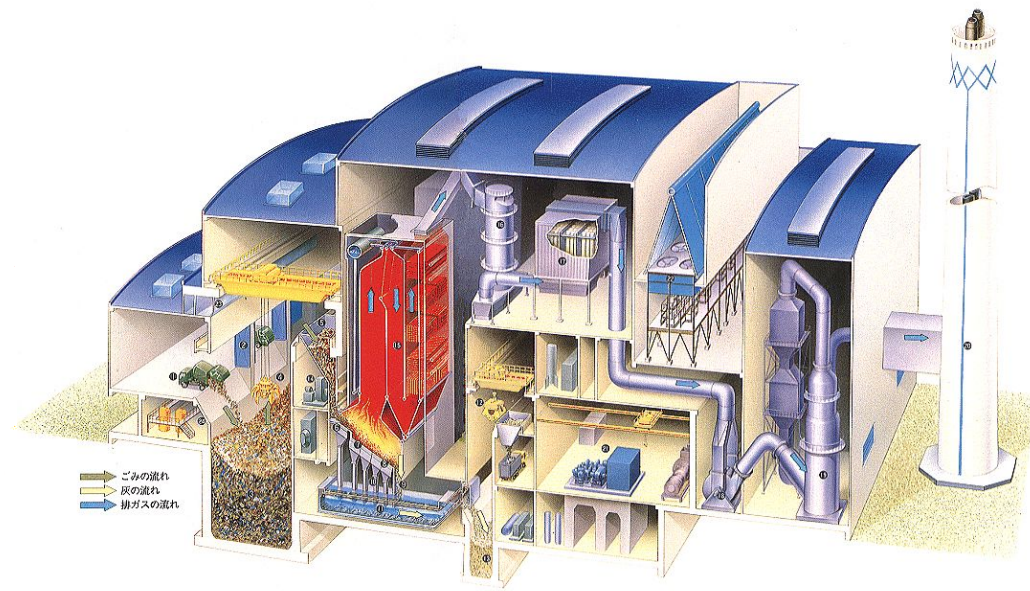


From Clean Association of TOKYO 23



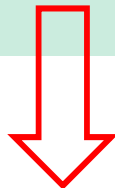
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Advanced Incineration Technology of Japan



Advantages and Disadvantages of WtE

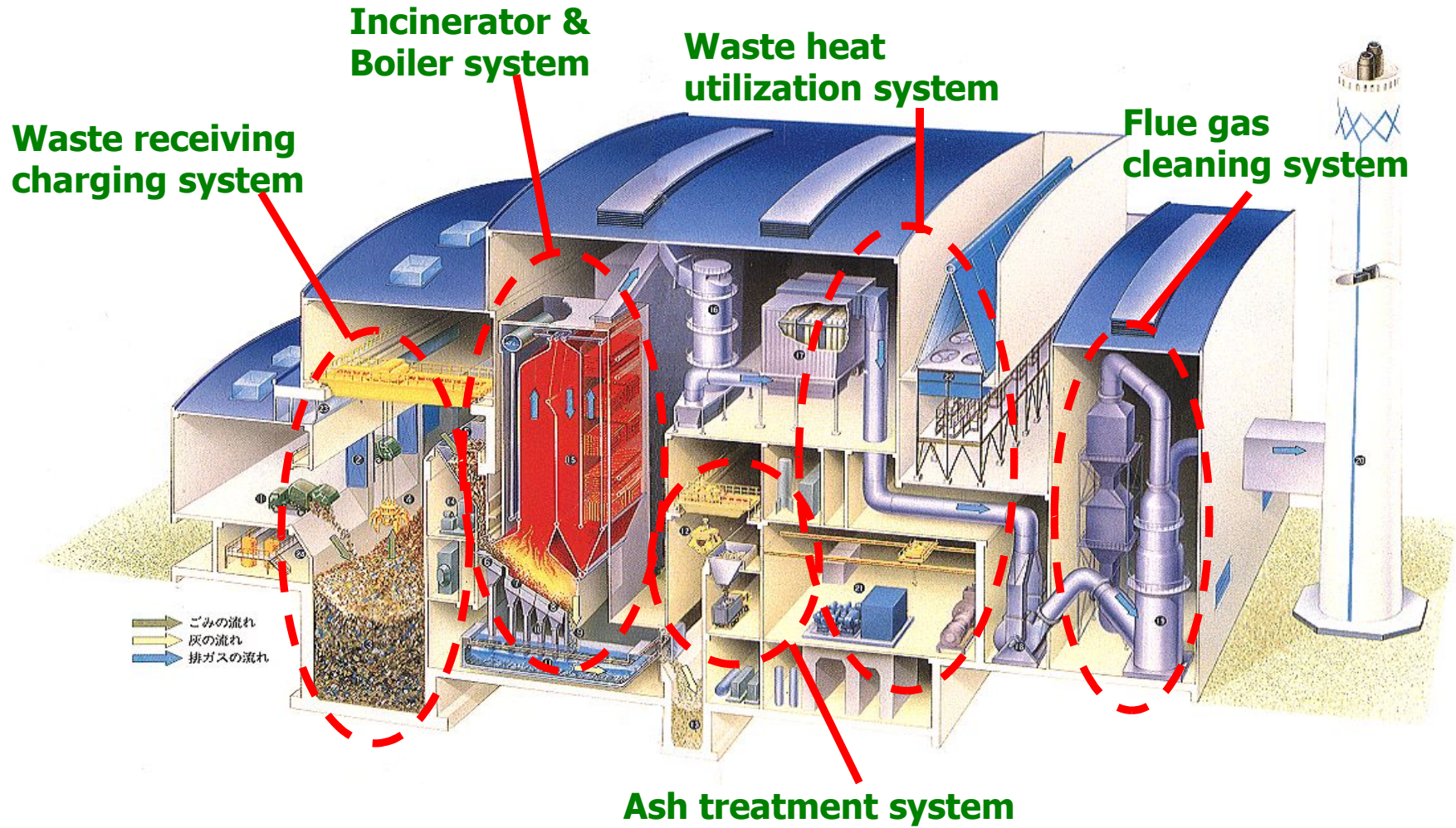
| Advantages | Disadvantages |
|---|---|
| <ul style="list-style-type: none">✓ Improvement of environment and sanitary condition around landfill site✓ Volume Reduction (Over 90%)✓ Mass treatment possibility✓ Good adaptability for treatment of various wastes | <ul style="list-style-type: none">✓ Negative image (hazardous pollutants emission, e.g. dioxin) ⇒ It's no problem by adopting the appropriate exhaust gas treatment system.✓ Higher Initial Cost than Landfill |



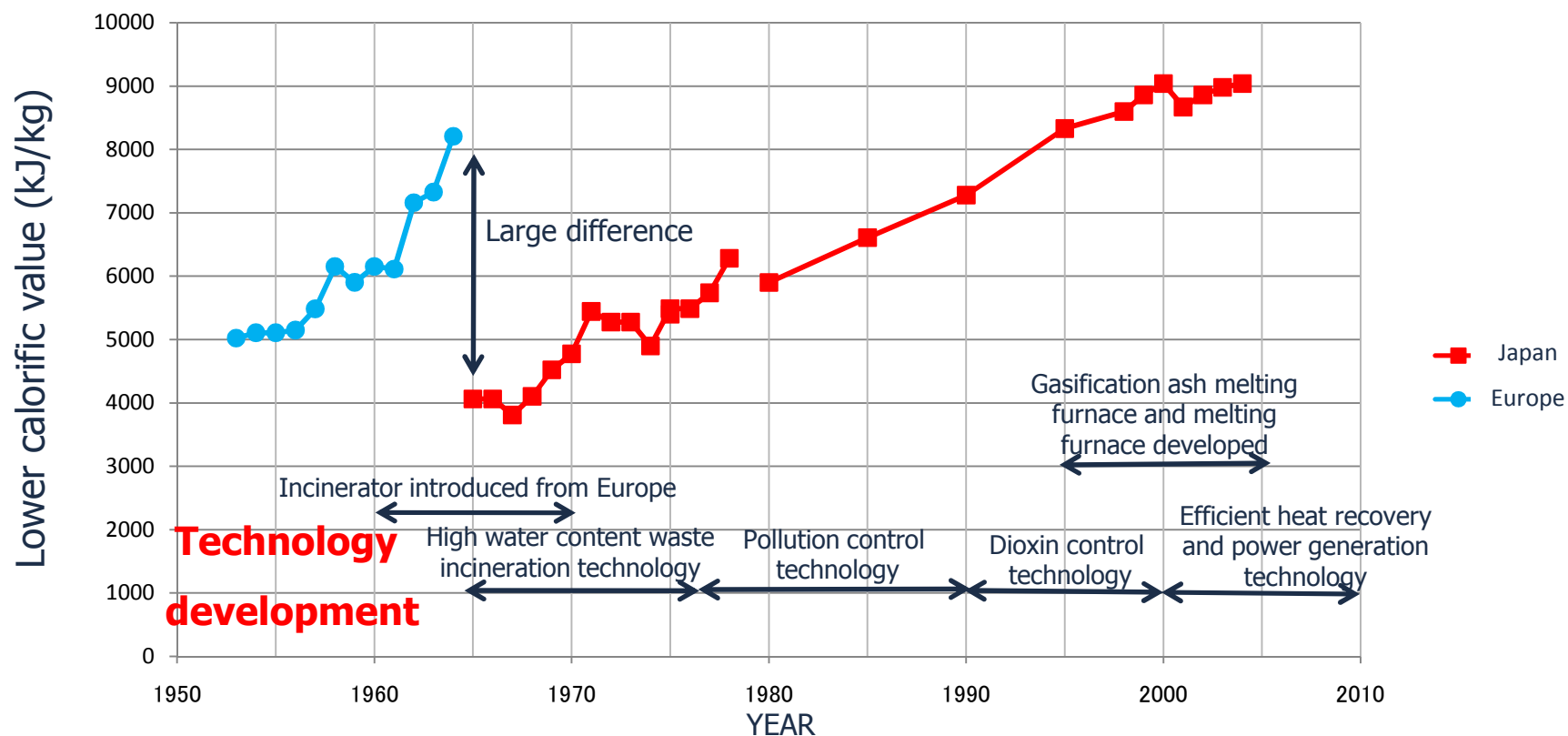
**With respect to
Waste to Energy**

- ✓ Provide the stable energy among the various renewable energy resources and contribute nation's energy security
- ✓ Carbon emission credit(especially in changing from landfill)

Waste to Energy Plant



Change in calorific value of municipal solid waste



1924: The first incineration plant in Japan

1960: The first machinery incineration plant completed(Japanese technology)

1965: The first waste to energy plant completed(European technology)

1996~2004: Ash melting mandated by the government

出典:

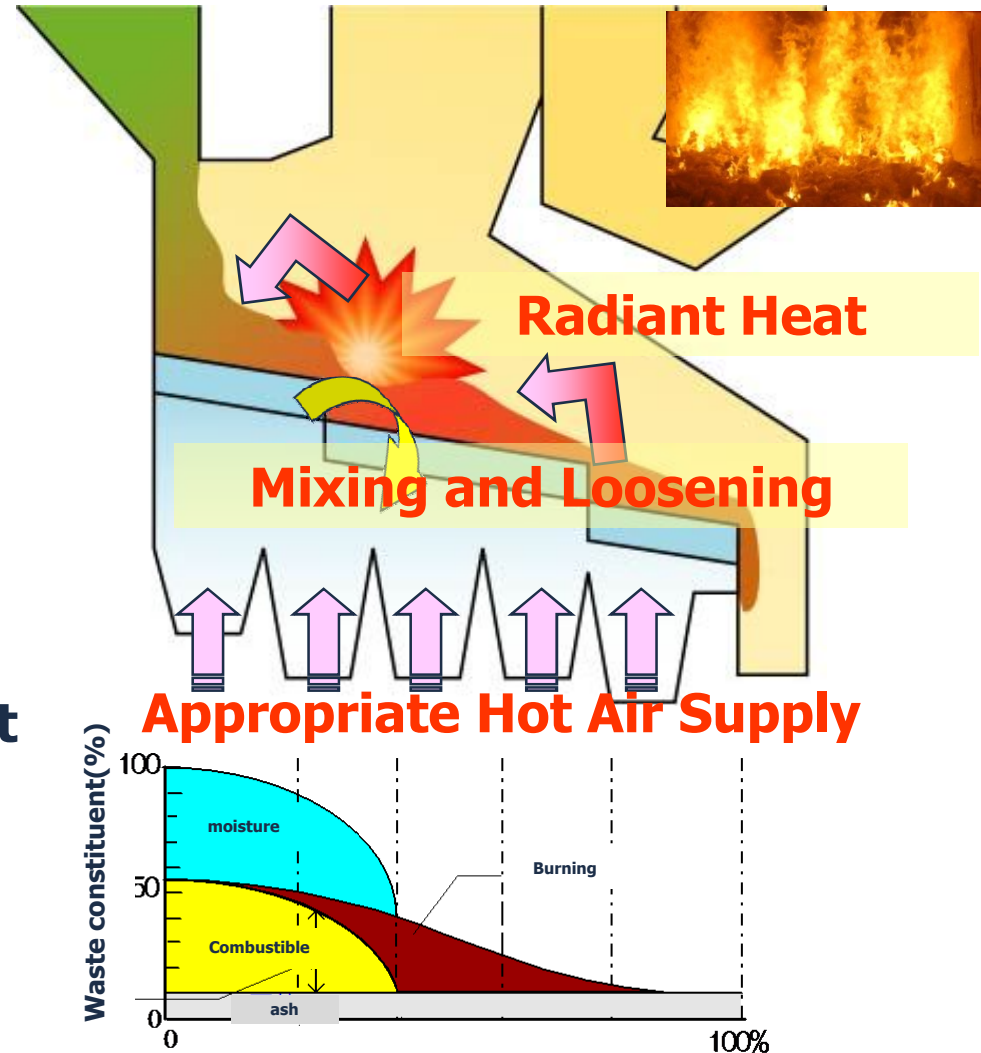
狩郷修 ごみ焼却炉選定の技術的評価

ごみ処理施設整備の計画・設計要領

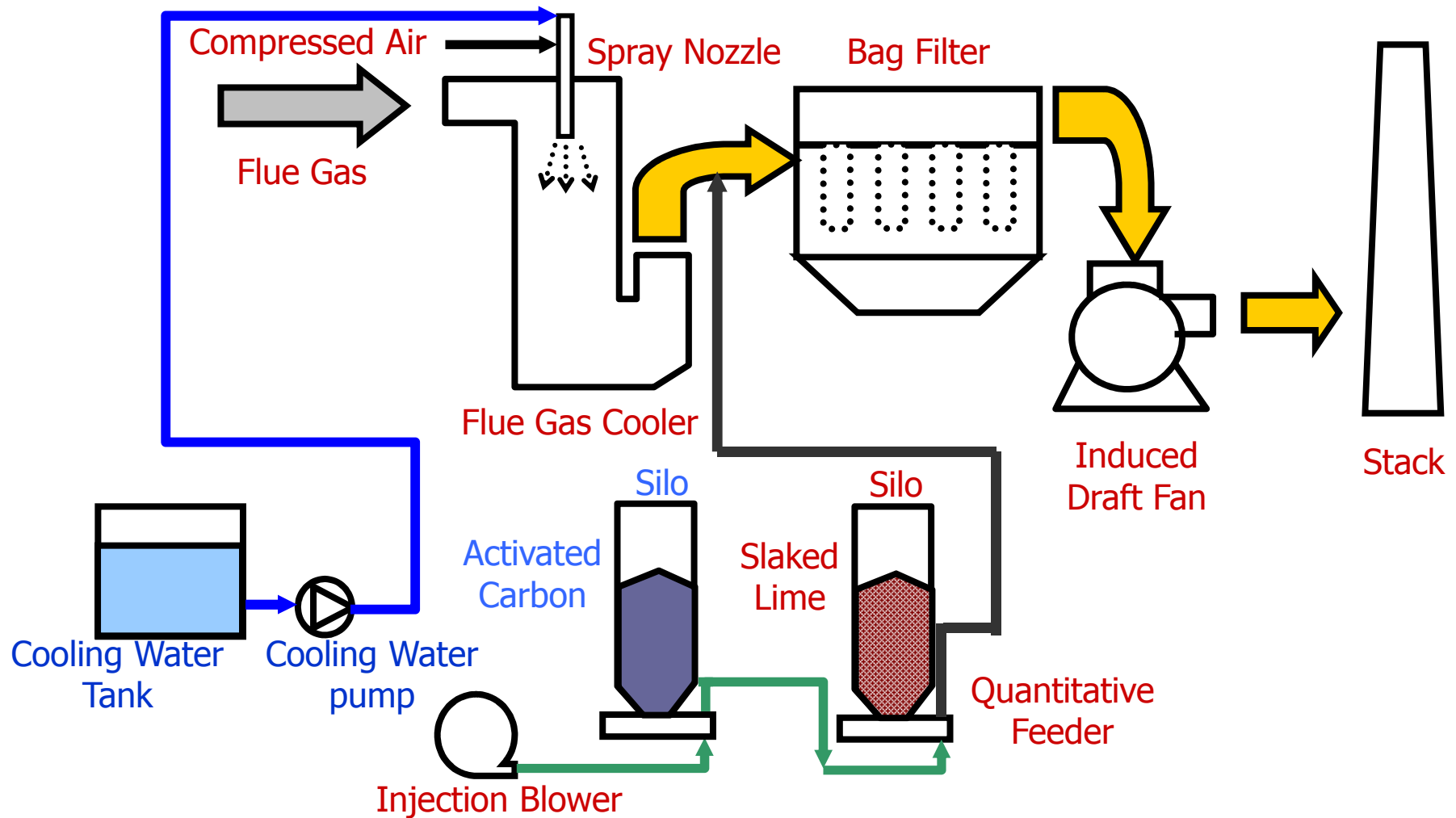
Technical Features of Incinerator

For Complete Burn Out of Low calorific Refuse

- ✓ Enough large grate area
- ✓ Good radiant effect for refuse drying
- ✓ Mixing and loosening of refuse by vertical step
- ✓ Appropriate supply of combustion air
- ✓ Capacity: 4-900t/day/unit

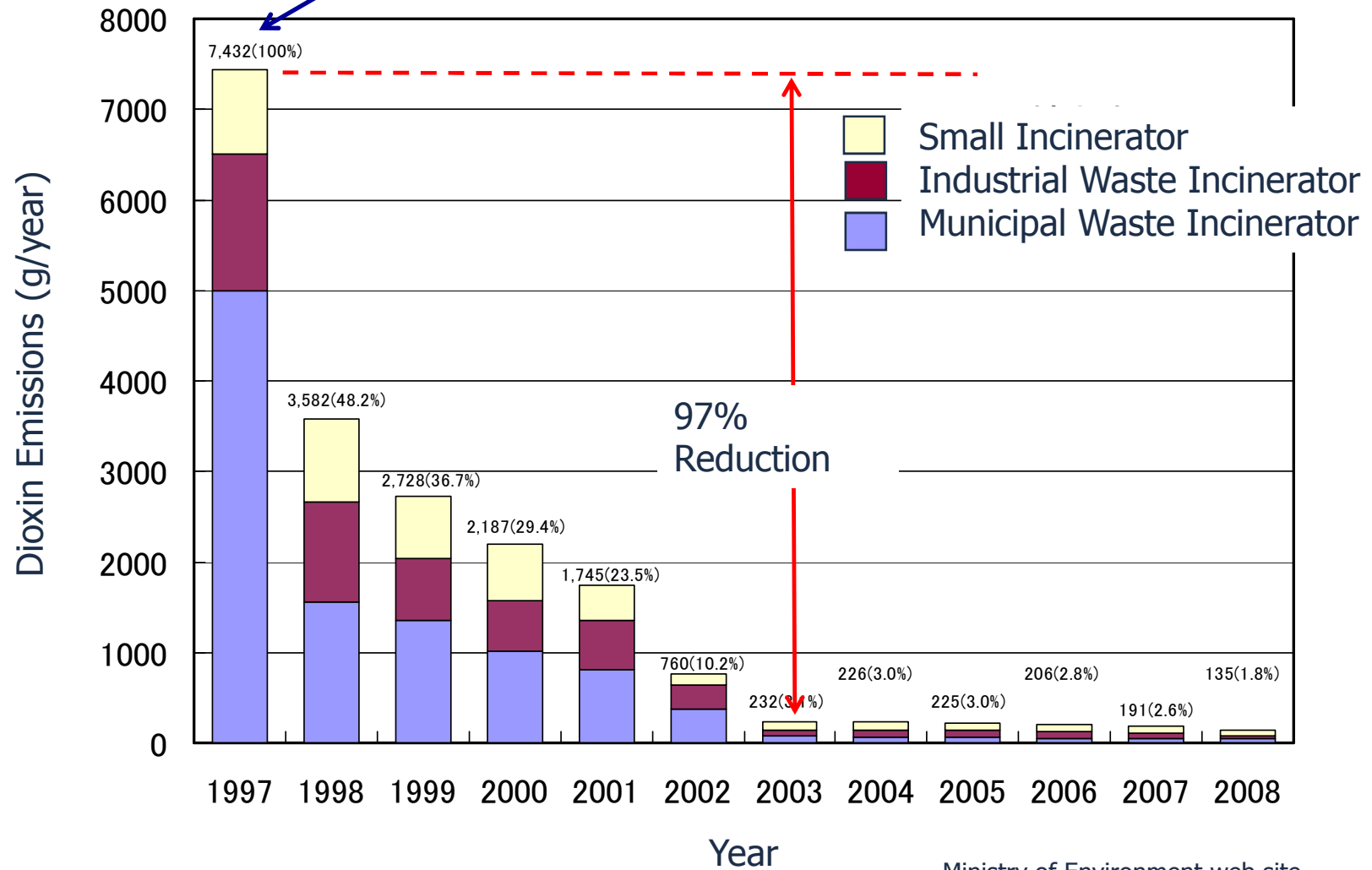


Flue Gas Cleaning System



Dioxin Emissions from Waste Incinerators in Japan

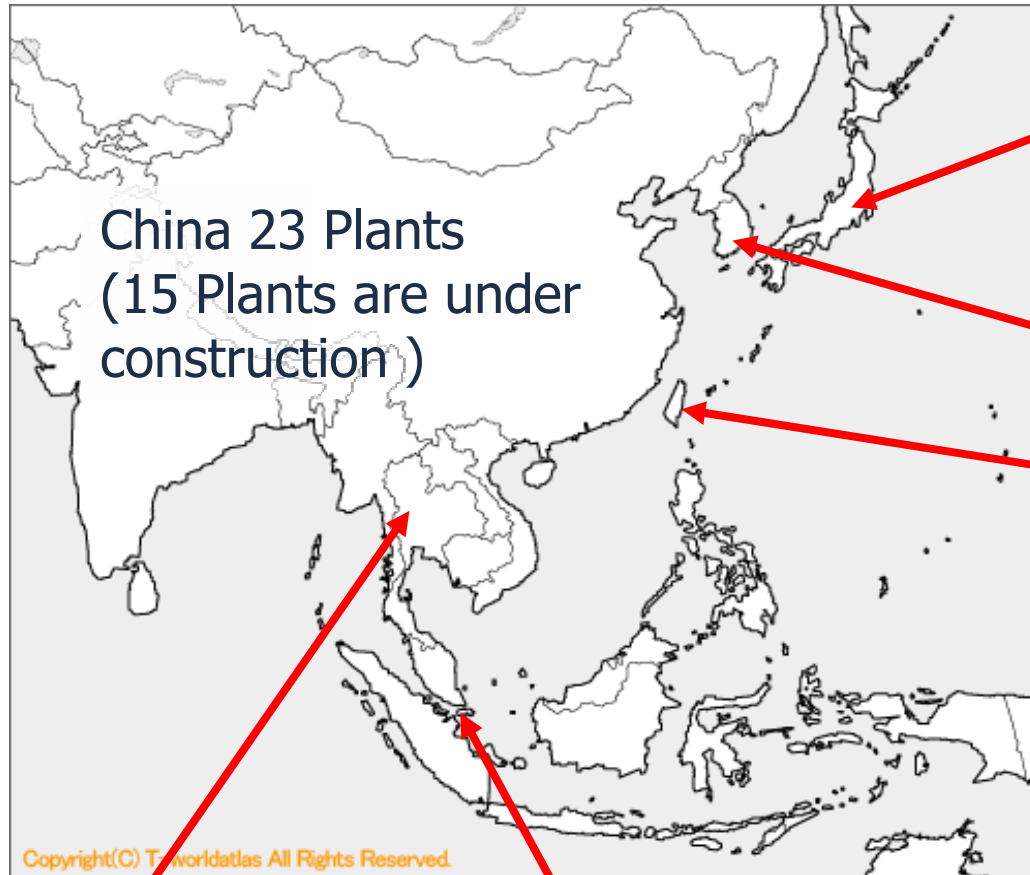
1997: Guidelines for Prevention of dioxin and related to waste disposal



Ministry of Environment web site



Waste to Energy Plant built by Japanese Company



Japan 800 Plants
For electricity 304 Plants
(1,673MW) (2009)

Korea 15 Plants

Taiwan 24 Plants

Thailand 1 Plants

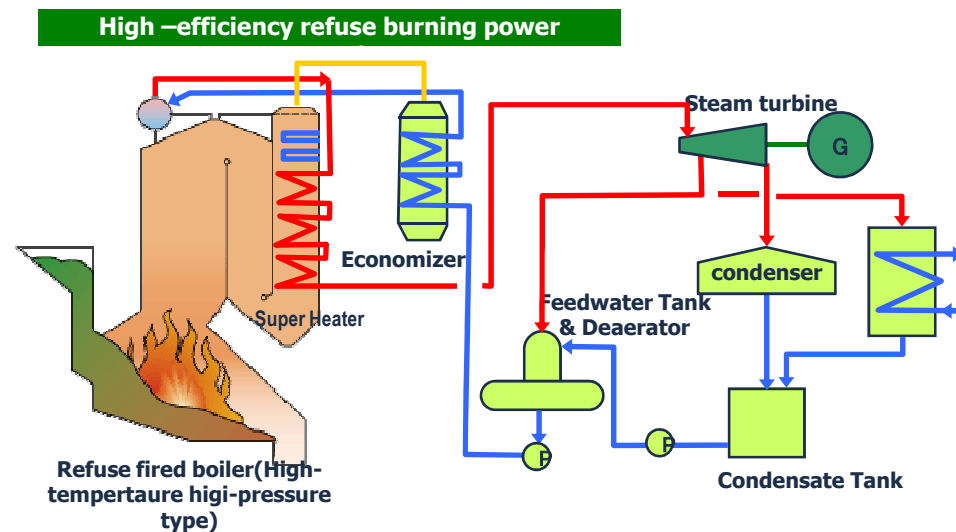
Singapore 3 Plants



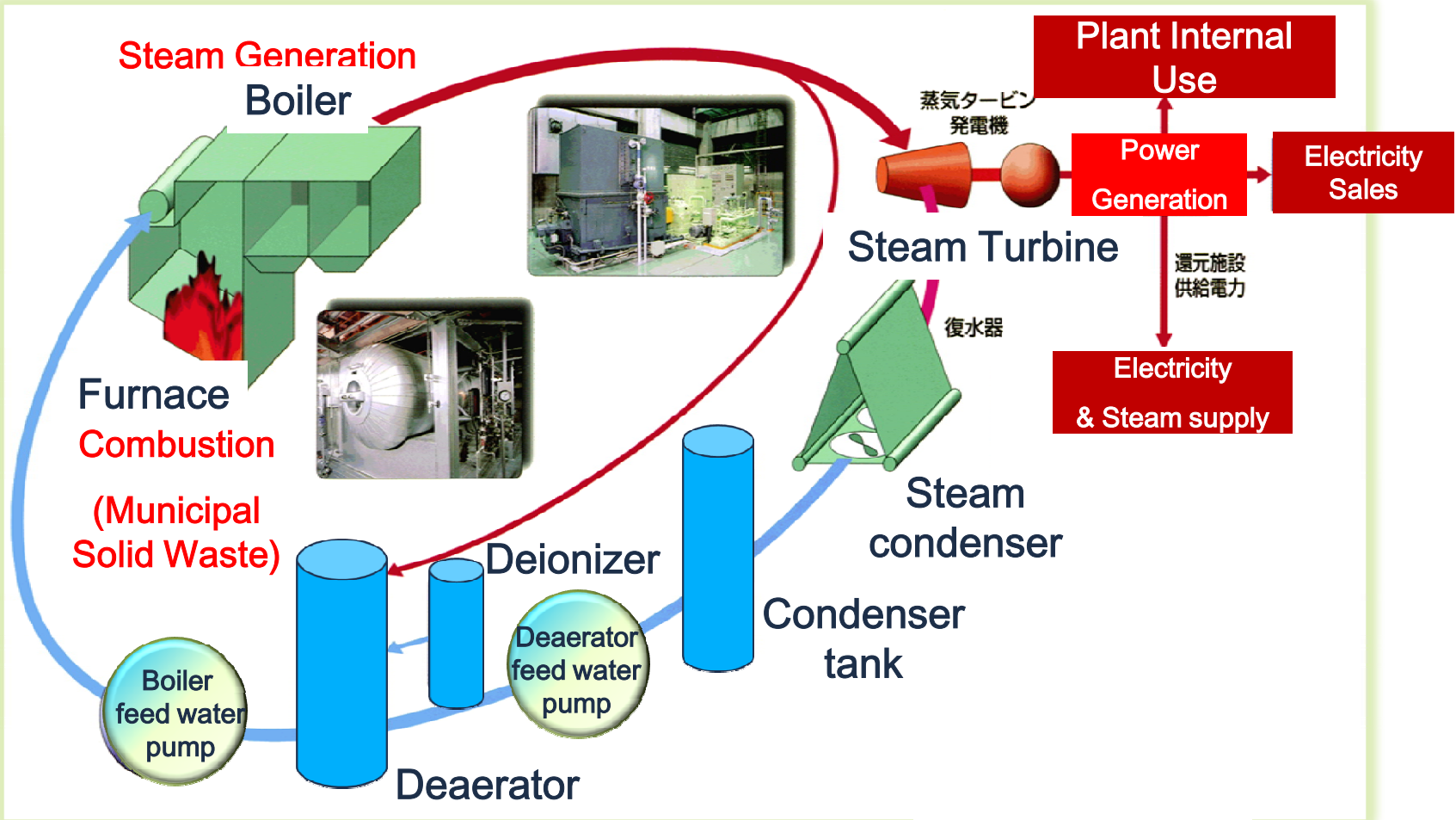
CHENGDU, China

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Waste Heat Recovery Technology of Japan



Efficient waste power generation Waste heat utilization system



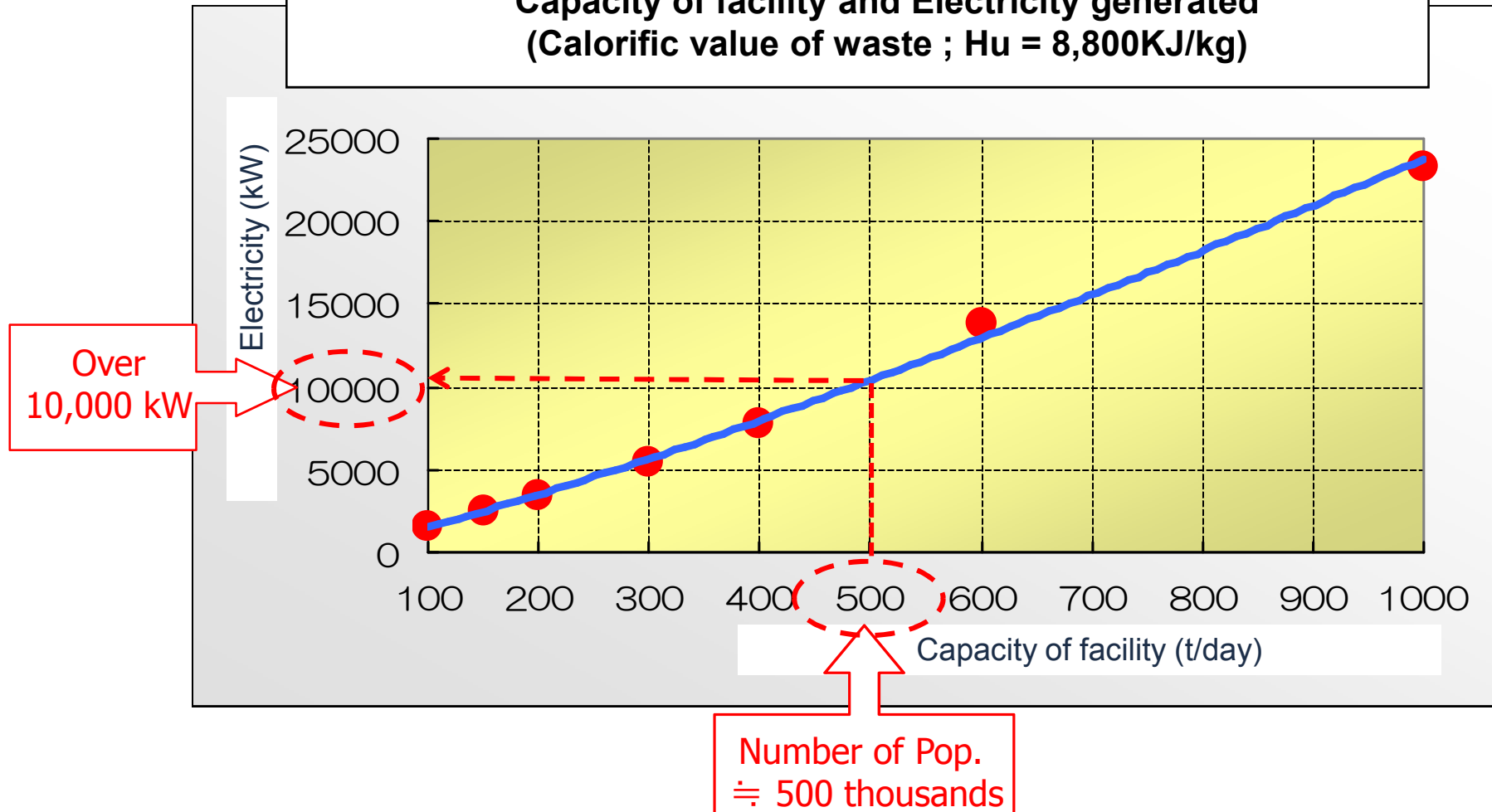
Steam Boiler → Steam Turbine → Electric Power Generation
 → Steam Supply to Demander

Hot Water Boiler → Hot water supply to Demander



Acquirable energy (electricity)

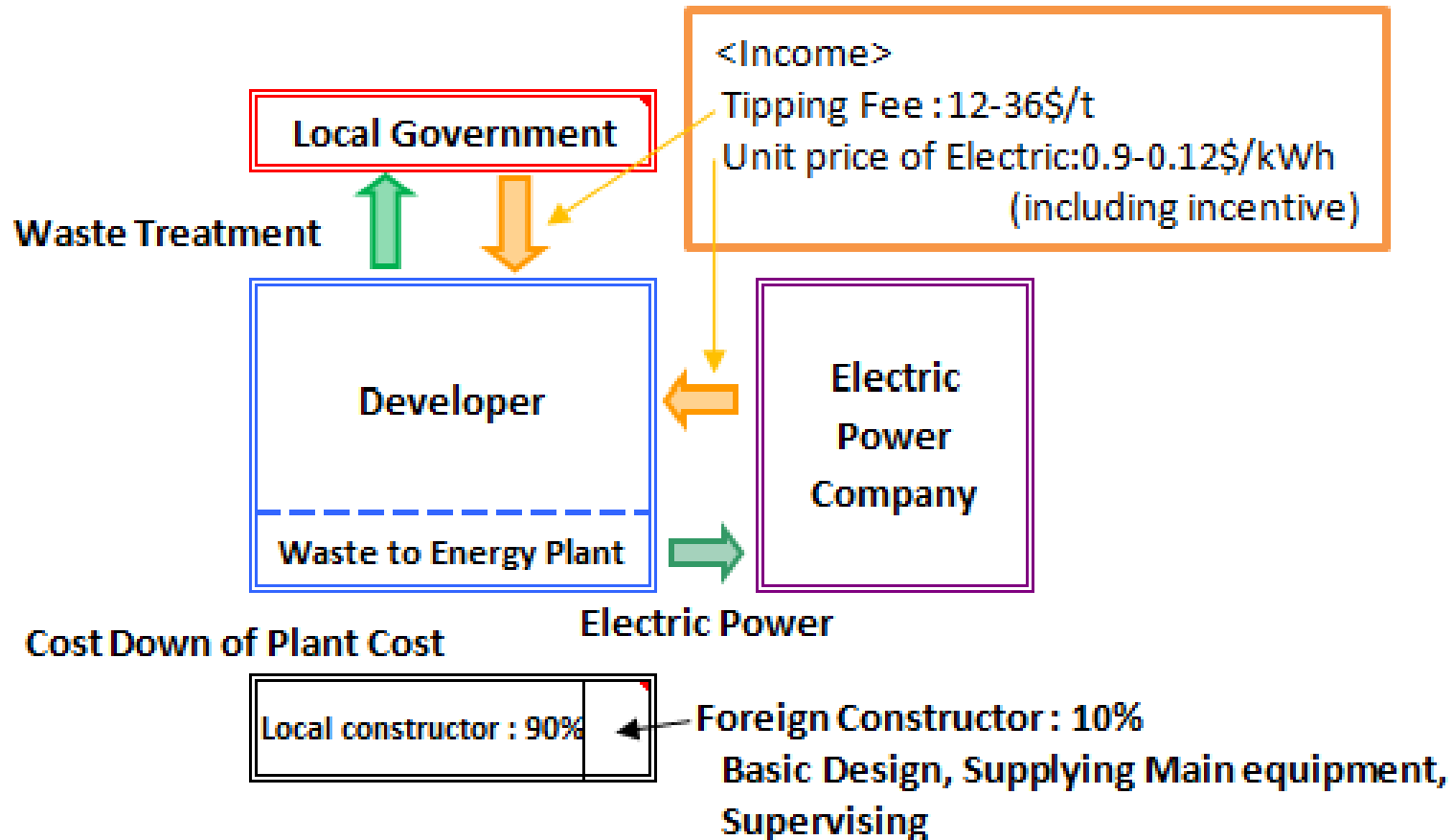
Relationship between
Capacity of facility and Electricity generated
(Calorific value of waste ; $H_u = 8,800\text{KJ/kg}$)



Business Model of waste Management



Business Model in China



Feed in Tariff Scheme for power from MSW

| | Purchase Price (USD/kWh) | Period | Comments |
|------------|---|----------|--|
| Japan | 0.22 | 20 years | Depending on the ratio of biomass |
| Germany | 0.19-0.22 | 20 years | Price for new facility decrease by 2% every year. |
| Netherland | 0.14 (Before 15 years) 0.09 (After 15 years) | | Over 500kW |
| Austria | 0.135-0.2 | 15 years | If fuel is waste, price decrease by 25-40% depends on biomass. |
| China | 0.09-0.12 | | Including incentive |
| Indonesia | 0.12 | | 1,050 IDR/kWh |
| Malaysia | 0.14 | | 0.42 MYR/kWh |

出典：ジェトロユーロトレンド 新局面を迎える欧州の再生可能エネルギー(RE) (2011.12)他

Feasibility Study

We research a municipality to be able to do a feasibility study together, with Japanese feasibility study scheme.

- ✓ **Research of Technical Feasibility**
 - **Survey of waste characteristics, LCV and amount of waste**
 - **Waste stream**
 - **Proposal of suitable waste treatment system**
 - **Estimation of electricity output**
- ✓ **Evaluation of Environmental and Social Impacts**
 - **GHG Emission Reduction Effect**
 - **Research of legal system and procedure related to Environmental Assessment**
- ✓ **Financial and Economic Feasibility**
- ✓ **Site Location**
- ✓ **Terms of Contract**
- ✓ **PPP, Etc.**