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Management of Sewage in Japan

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JSWA Japan Sewage Works Association

Japan Sewage Works Association; JSWA

- 1964 Set up to represent interests of sewage service utility
- 1967 Certification of sewer products starts
- 1987 Annual exhibition starts
- Membership
  - 1500 utilities, 900 Companies, 500 Individuals
- Activity
  - Interest representation
  - Standard and guideline
  - Public awareness campaign

Service Accessibility & Issues

- **Service accessibility; 91%, 82% offsite and 9% onsite, 2019**
- **3 Major issues;**
  - **Aging infrastructure and sustainability**
  - **Disaster management; earthquake, tsunami, extreme storm**
  - **Circular economy, low carbon footprint, resource recovery**

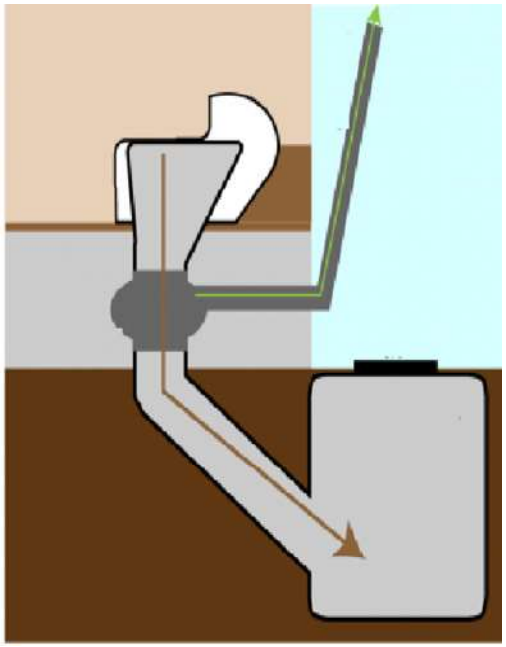
Today's topics & angles

- Onsite System, Unique to JP
- MBR, Energy Efficiency
- Sludge Management, Energy Recovery

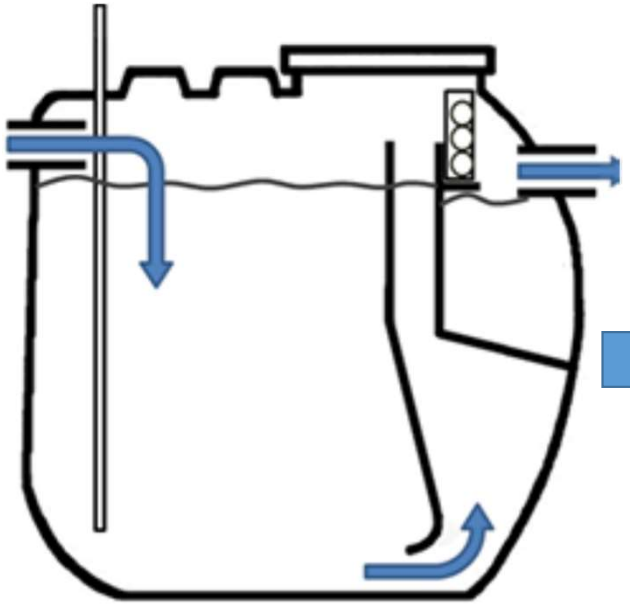
- Experience in JP
- Lessons learnt
- Drivers & Barriers

Development of onsite STP system

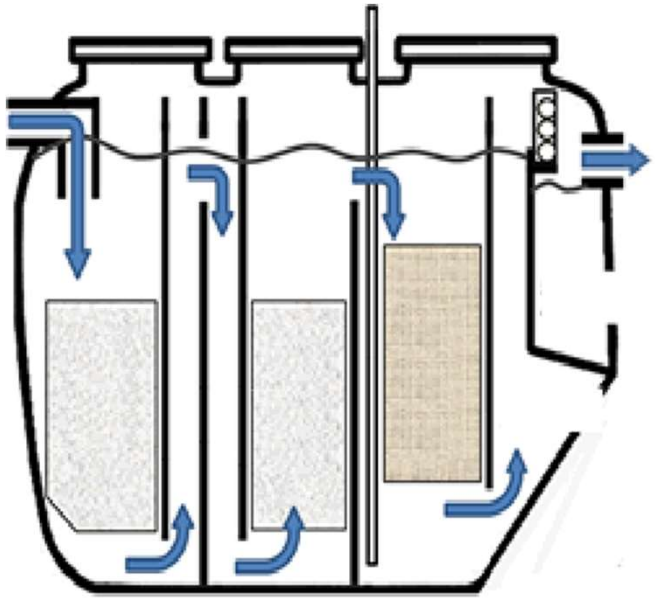
- Poor system just for human waste, excluding grey water, led to pollution.
- Current onsite STP system helps achieve clean water nationwide



Human waste storage



HW aerobic treatment



Anaerobic aerobic biofilm tr. for domestic sewage

Issues & Solutions

JP faced several issues

- **QC on installation**
- **Regular desludging and maintenance**
- **Monitoring of Effluent Quality**

→Legislation, education, partnership, subsidy for installation

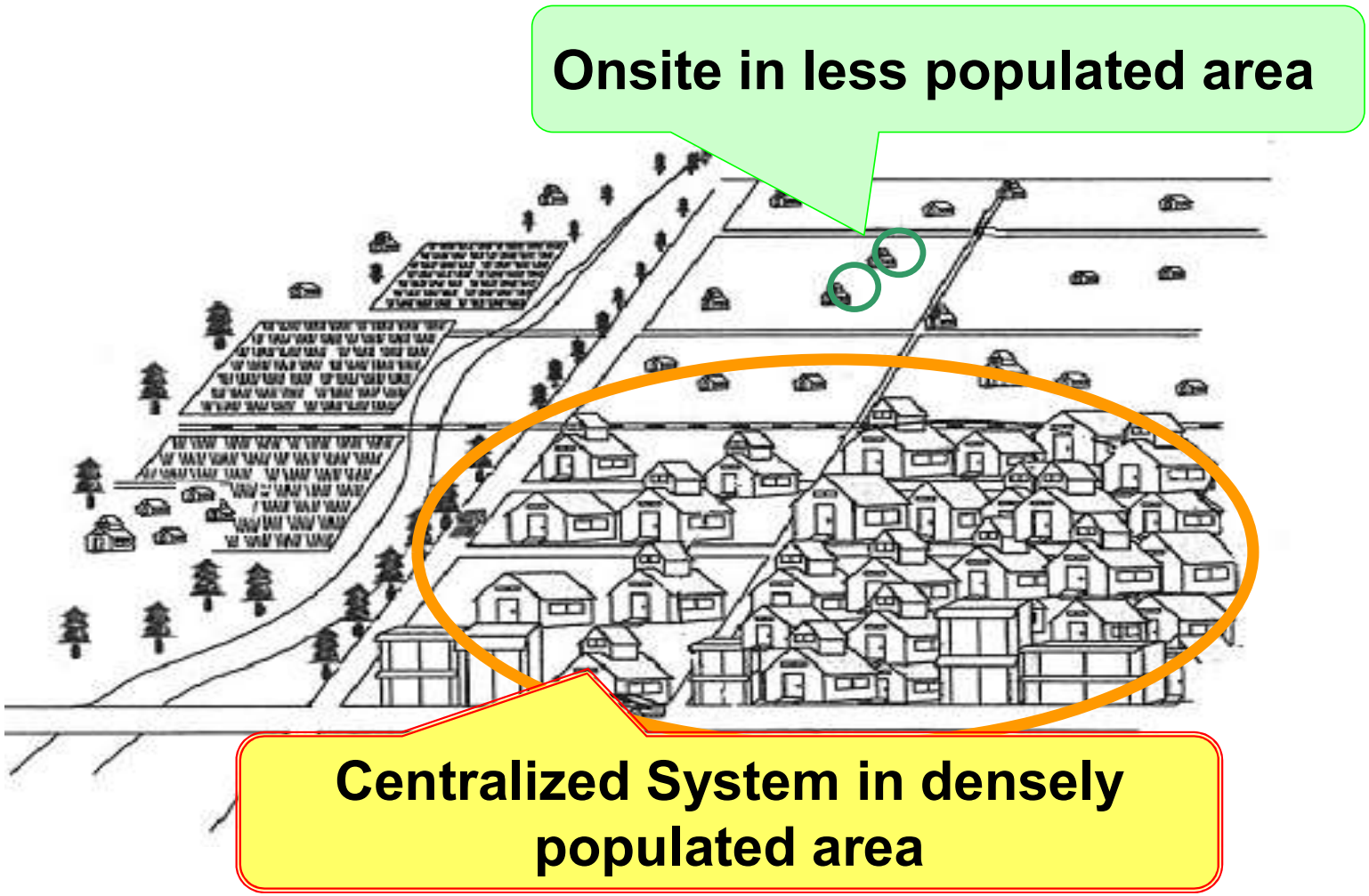
- **Coordination between onsite & offsite, from planning to implementation stage**

→Guideline by Central Gov offices, Municipal & Prefectural Masterplan

Onsite STP Act since 1983

- **Manufacture: Certification**
- **Installation: Standards, Contractor Registration, Certified Supervisor**
- **Inspection: 3 times/y or more, Contractor Registration, Certified Inspector,**
- **Cleaning & Desludging: Once a year or more, Permitted Contractor**
- **Effluent Monitoring: 3 month after installation, once a year, designated lab**

Demarcation of Onsite and Offsite



MBR, offsite

Perception of JP Utilities

- **Water reuse low priority**
- **Small footprint attractive**
- **Concern high energy consumption & membrane life**

→R&D energy reduction underway

→Expected rising use by PFI upon Rehab

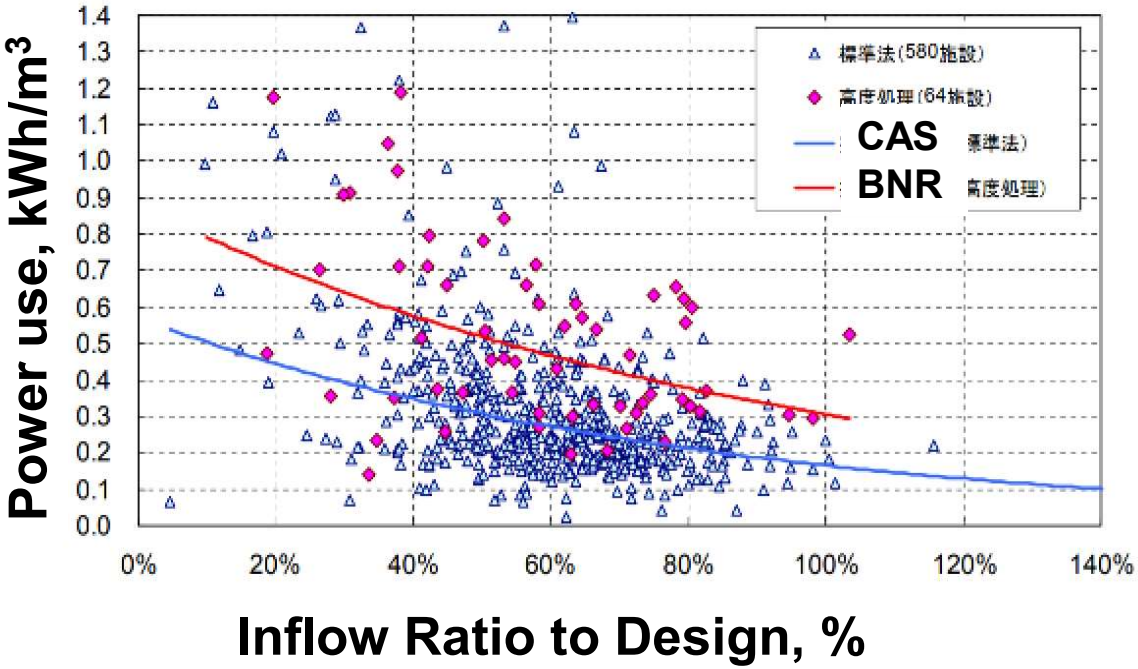
MBR under operation & Energy Reduction

- 22 STPs out of 2,200 in total
- Oldest started in 2005
- Biggest cap. 20,000m^3/d

Japan Sewage Works Agency's full scale demonstration confirmed 0.24-0.39kWh/m^3 for 5 MBR brands.

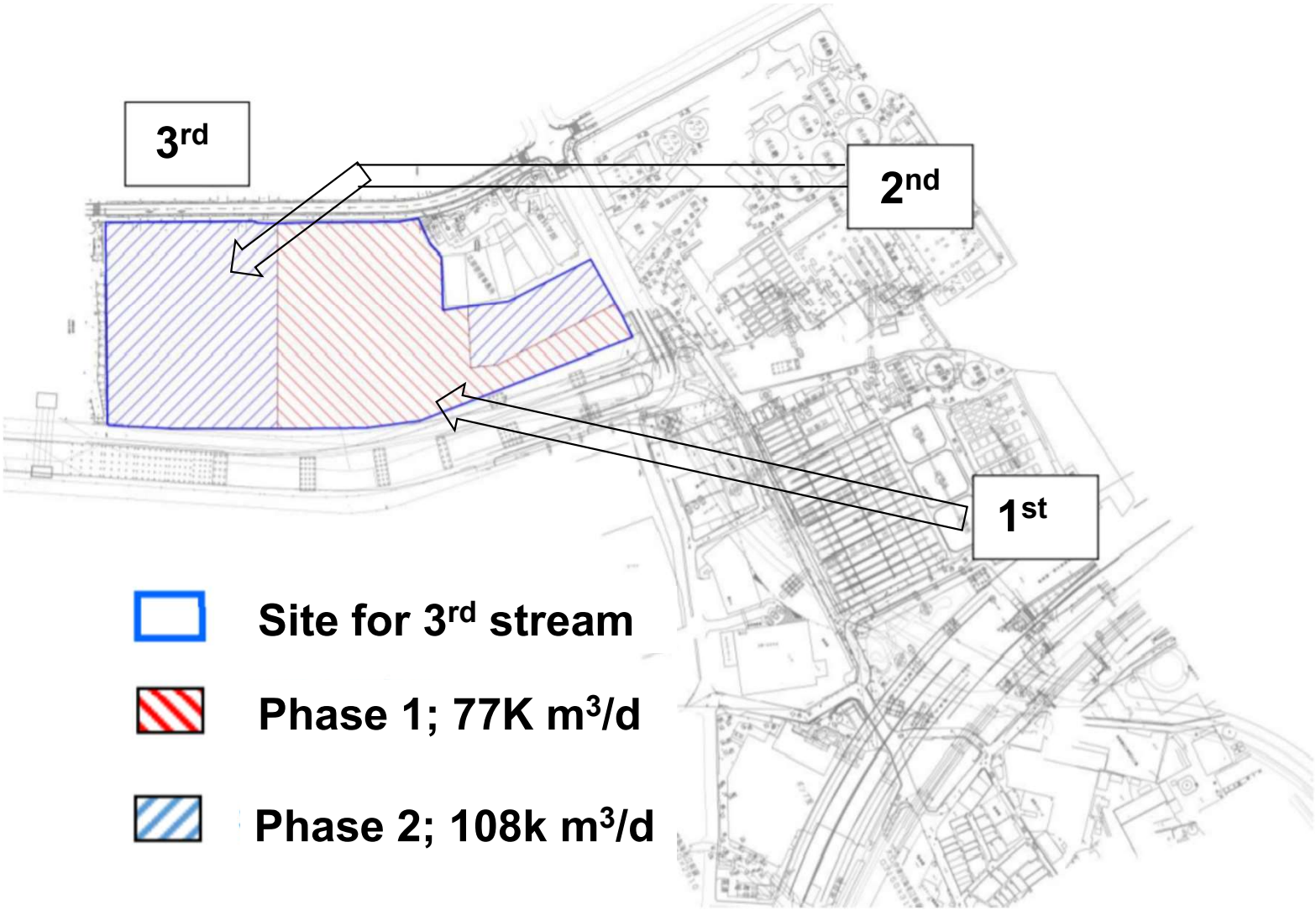
Courtesy of Dr. H. Itokawa

MBR Energy Goal 0.4kWh/m^3



Rehab of 80yr old STP with MBR, Osaka, PFI

77,000m^3/d under construction with MBR

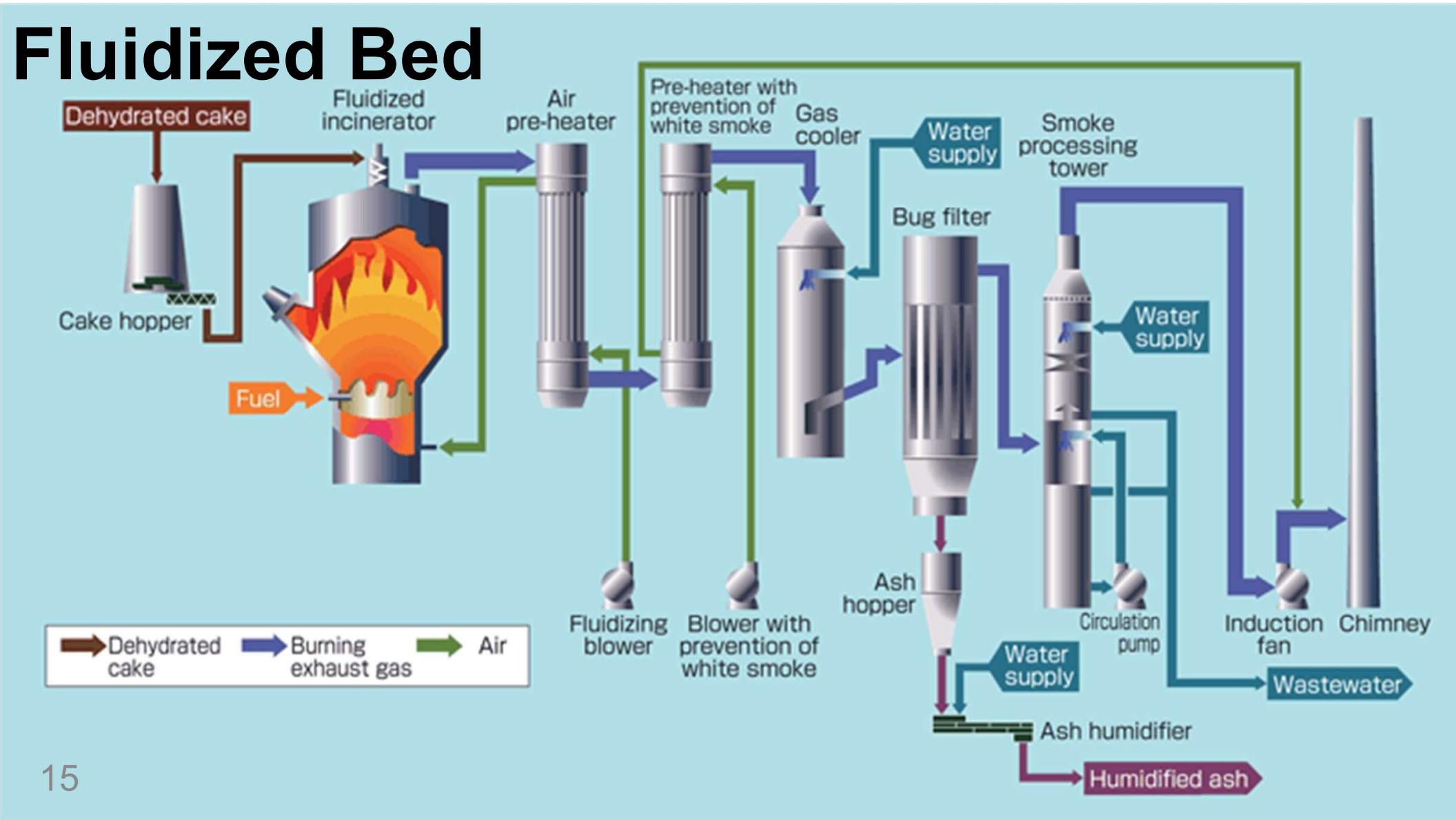

3rd
2nd
1st
Site for 3rd stream
Phase 1; 77K m3/d
Phase 2; 108k m3/d

13 **Lack of Space: Proximity of Residence and STP: NIMBY**

Sludge Recycle

- Construction Industry: major recycler of incineration ash
- Agriculture: minor recycler
- Energy: rising recycler
- 76% Solids and 35% Organics recycled, 2018 MLIT data
- Driver: Landfill capacity limited & expensive
- Driver: FIT introduced to generate power after energy crisis
- Barrier: NIMBY surrounding STP

Fluidized Bed



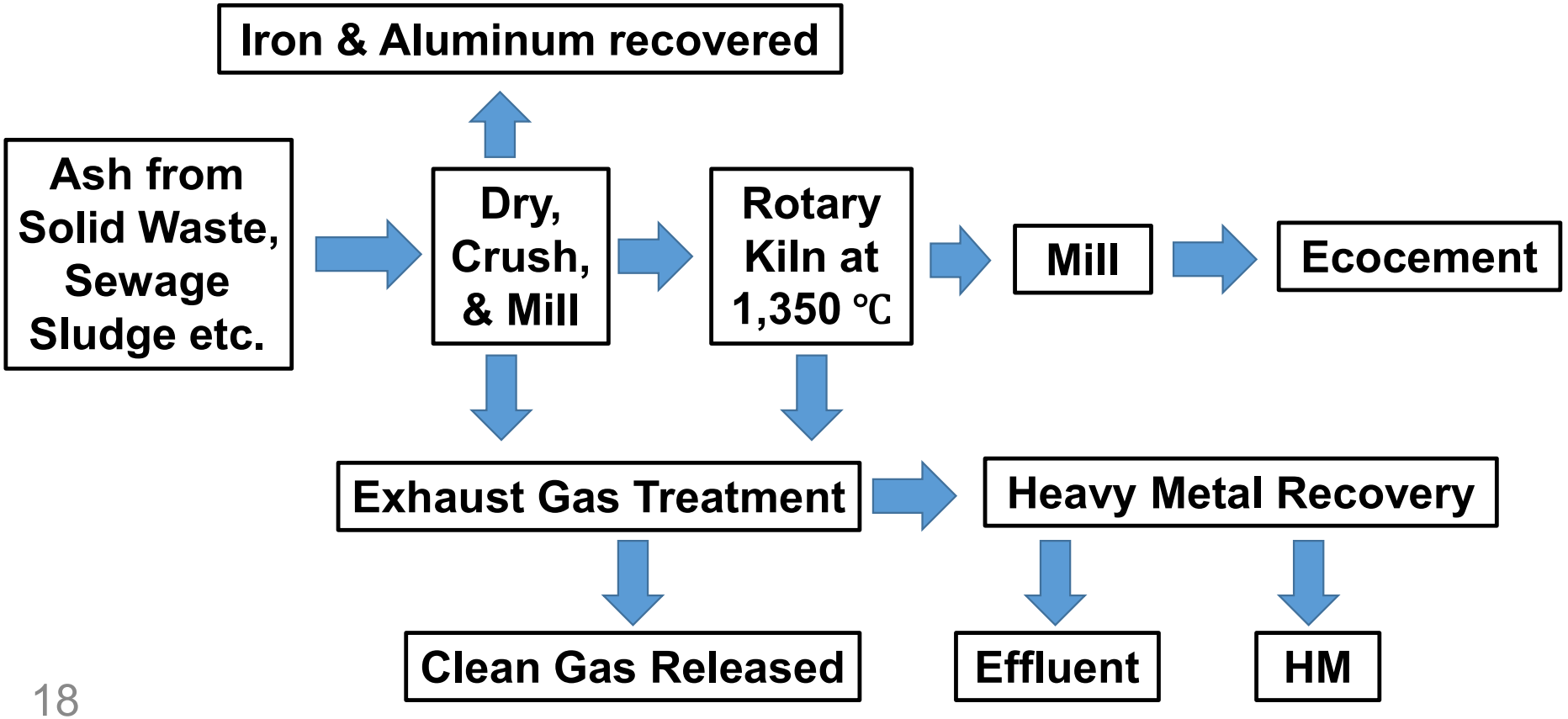
PFI for ash recycle in Yokohama

Ash

Waste Soil

Improved Soil

Ecocement, JIS R 2514



Energy Recovery from Sewage Sludge

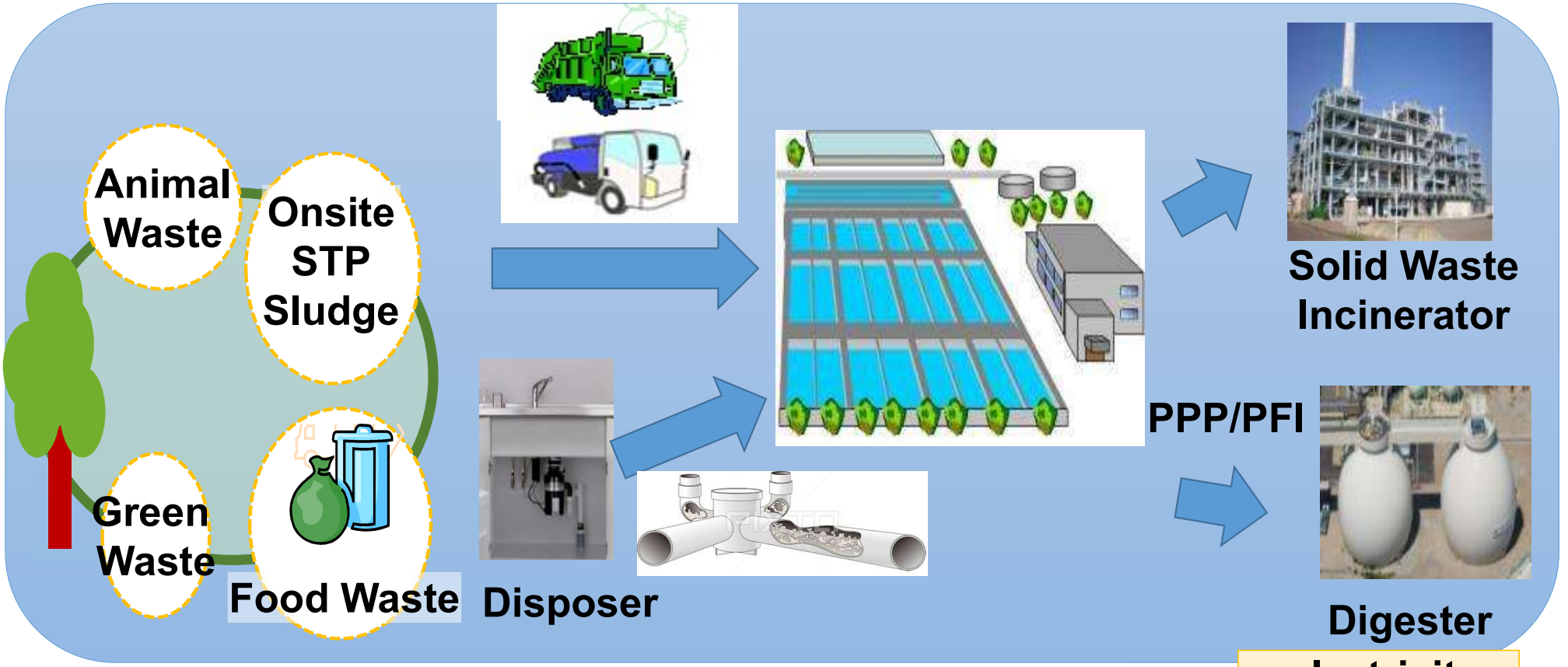
Pathway

1. **Biogas for power generation**
2. **Biogas as natural gas alternative**
3. **Solid fuel as alternative coal**
4. **Incineration for power generation**

Barriers

1. **Lack of energy source because of NIMBY**
2. **No driver such as FIT for electricity**
3. **Solid fuel sidelined from FIT**
4. **Watery SS low temp inefficiency & small scale inefficiency**

Co-digestion by augmentation

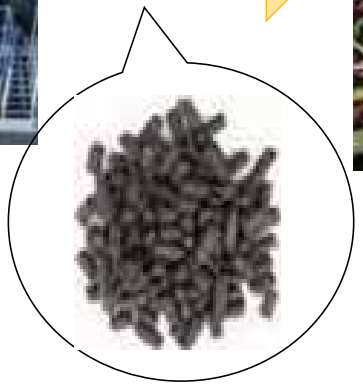


8 projects underway

Biochar Production by Pyrolysis at Aichi

STP

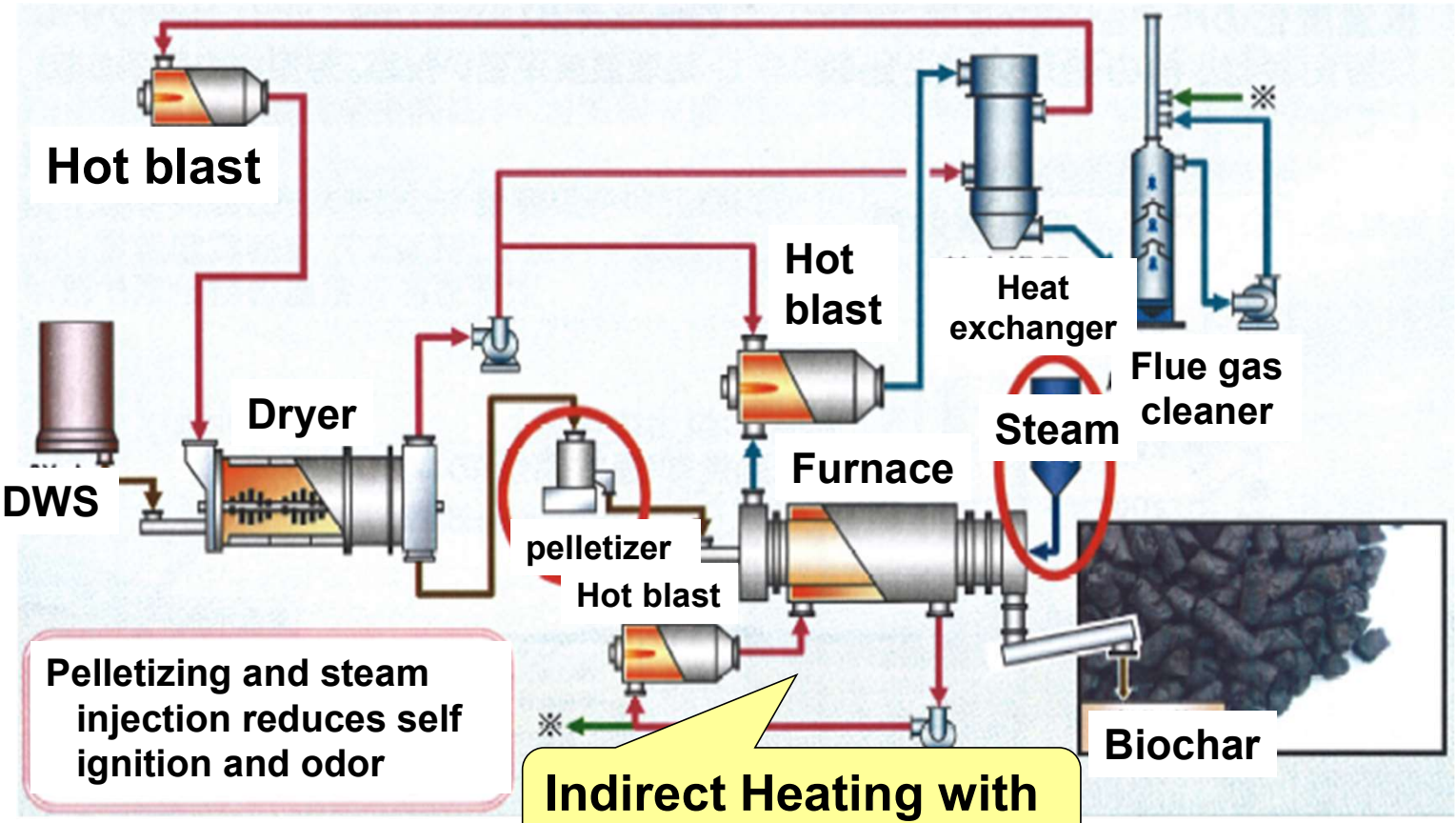
solid fuel



Coal fire power plant

electricity

Pyrolysis Process



Biogas refinery, natural gas alternative at Kobe

Incineration for Power Generation at Wakayama

Sludge; 35t/d, 70% water
Capacity; 100kW

Centrifuge

Stoker with Boiler

Steam Generator & Binary G.

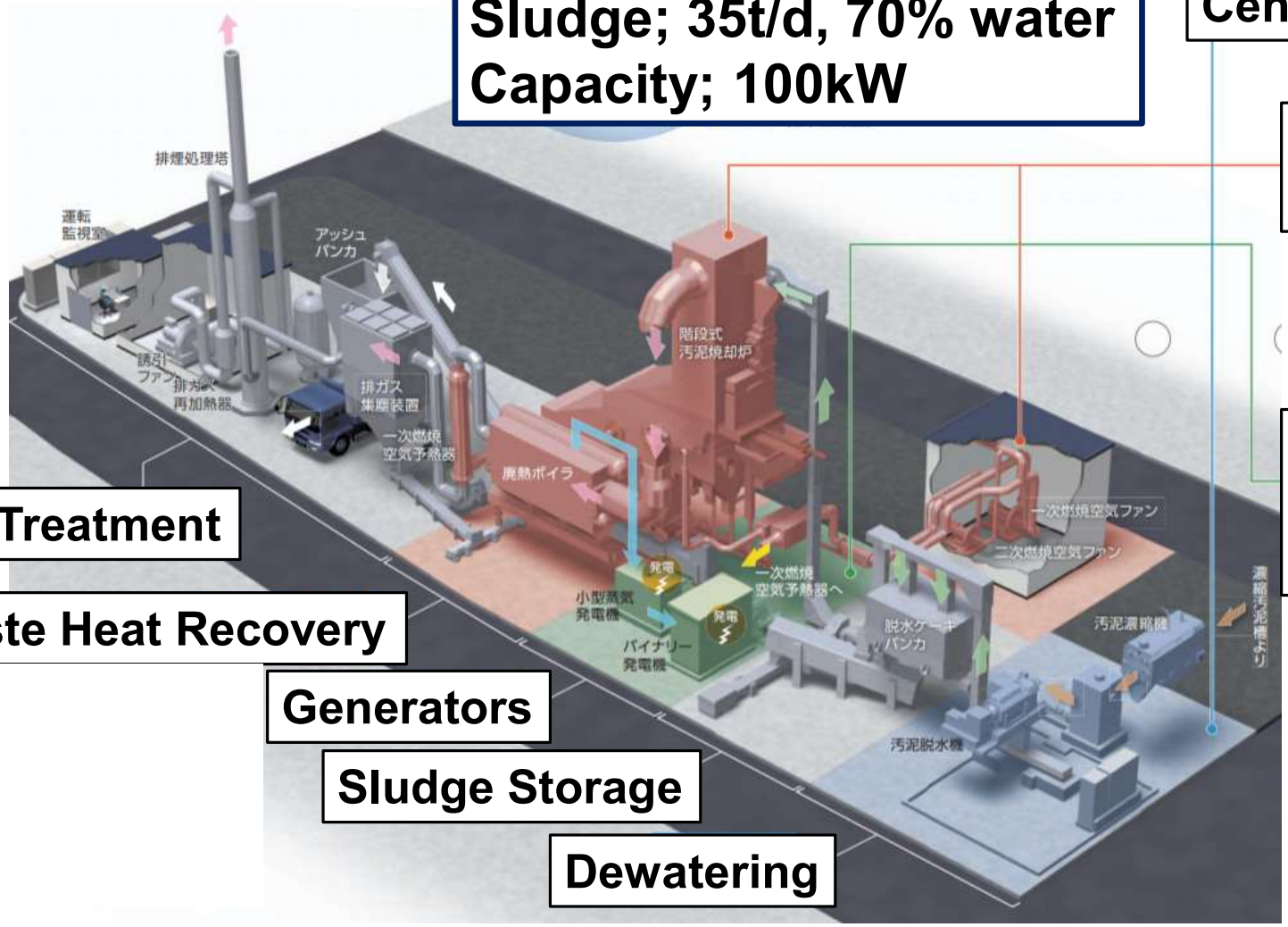
Waste Gas Treatment

Waste Heat Recovery

Generators

Sludge Storage

Dewatering



Municipal Solid Waste Incineration; Power Plant

- 9,207GWh generated by 376 solid incineration plants in 2017
- Equivalent of 1.7M households' use
- Note; 5,500kwh/y on average for family of 4 in JP.
- Rising Trend, but lack of energy source due to limited waste source only from household excluding waste from industrial activity
- Small scale inefficiency due to municipal boundary
- Low temp inefficiency due to corrosion of furnace in high temp


Yokohama City
北部第二水再生センター
100t/d@2+150@2+200@1
横浜市鶴見
資源化センター
東芝エネルギー
システムズ
ふれーゆ
鶴見川河口末広
水際線プロムナード
400t/d@3
22,000kw

Question?