

# Research Projects on Gasification at Institute for Advanced Engineering (IAE)

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# Current Gasification-Related Projects at IAE

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## ✓ Coal Gasification :

- 1) Korea Electric Power Research Institute, Korea Western Power Co.  
(Pilot tests with candidate coals, metal/ceramic filters, etc.)
- 2) Korea Electric Power Research Institute  
(Pilot tests for hot gas cleanup, WGS reactor)
- 3) SK Energy  
(Pilot tests)

## ✓ Synthetic NG from Coal :

- 1) POSCO  
(Pilot tests with commercial catalysts, etc.)

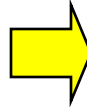
## ✓ Wastes Gasification :

- 1) One 50 ton/day project on gasification of medical wastes  
(Design/Pilot tests)
- 2) One 50 ton/day project on syngas production from wastes for  
chemical company  
(Design/Pilot tests)

# Gasification Facilities at IAE



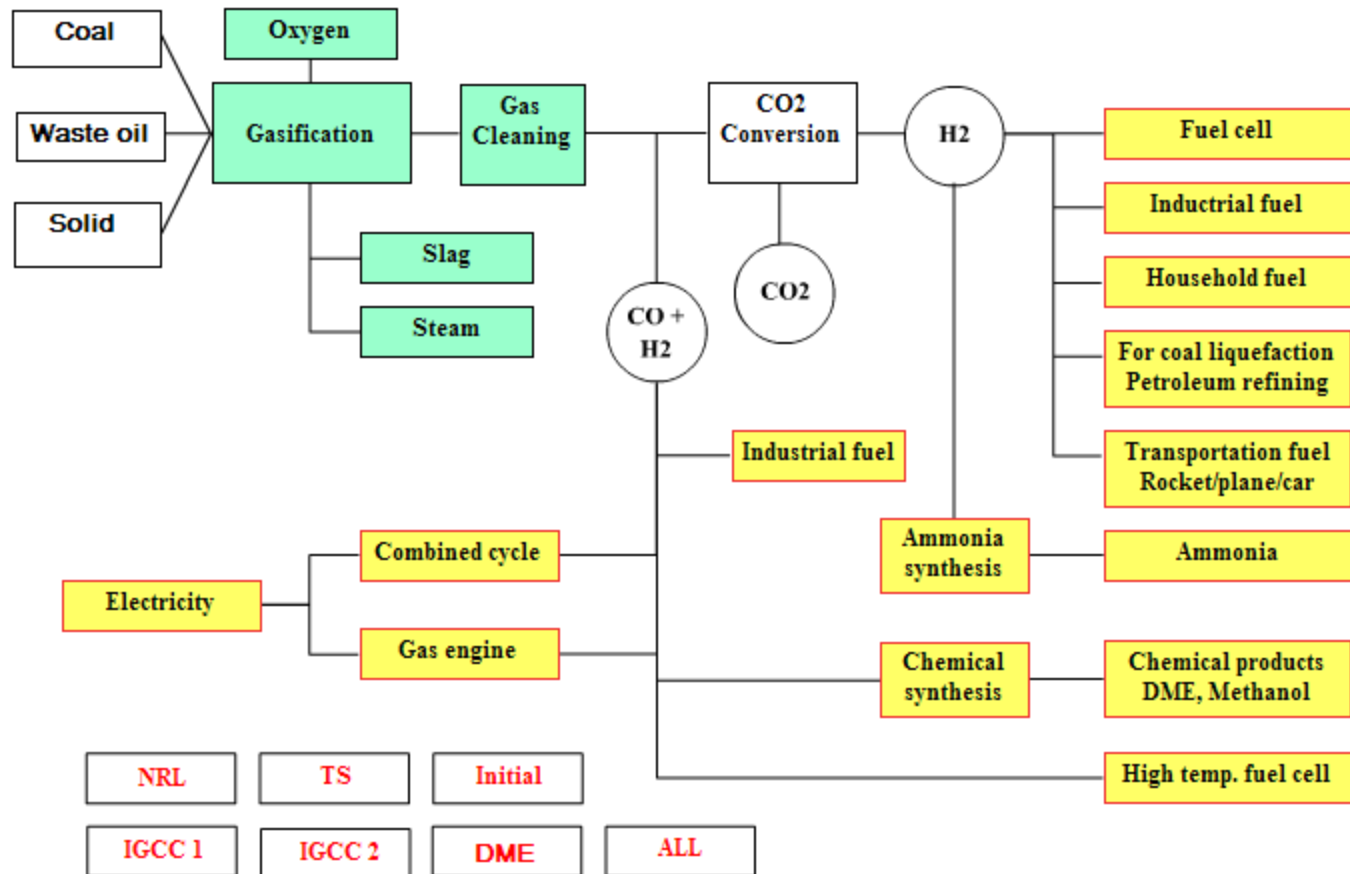
**Low grade fuel  
(Coal, waste, ....)**



**Gasification/melting**



**Clean fuel/Chemical  
Zero emission**



# 1) 3 Ton/Day Coal Gasification Pilot Plant

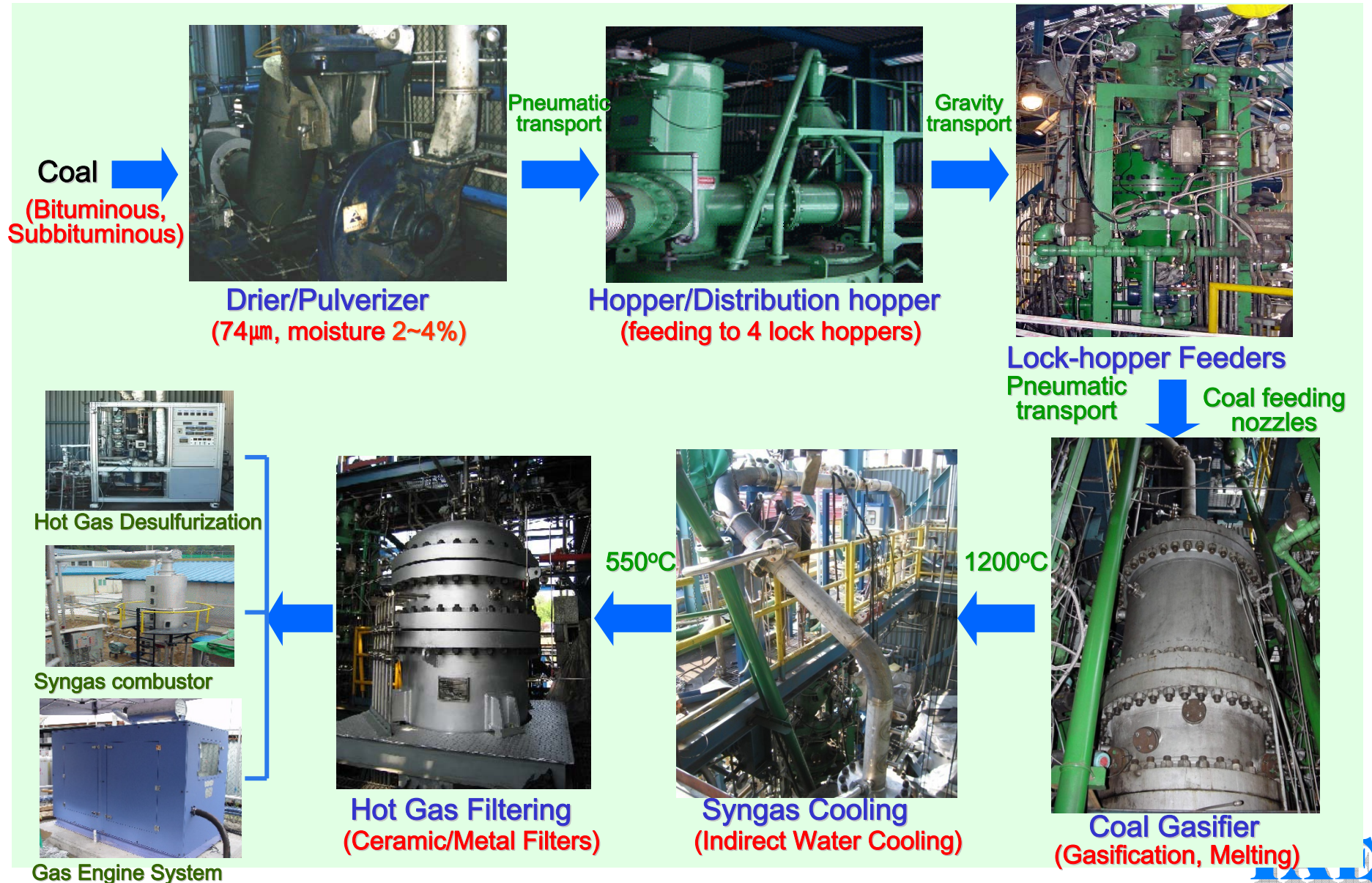


**Operated from 1995**  
**(Max. Pressure: 28 bar,**  
**Max. Temperature: 1550°C)**



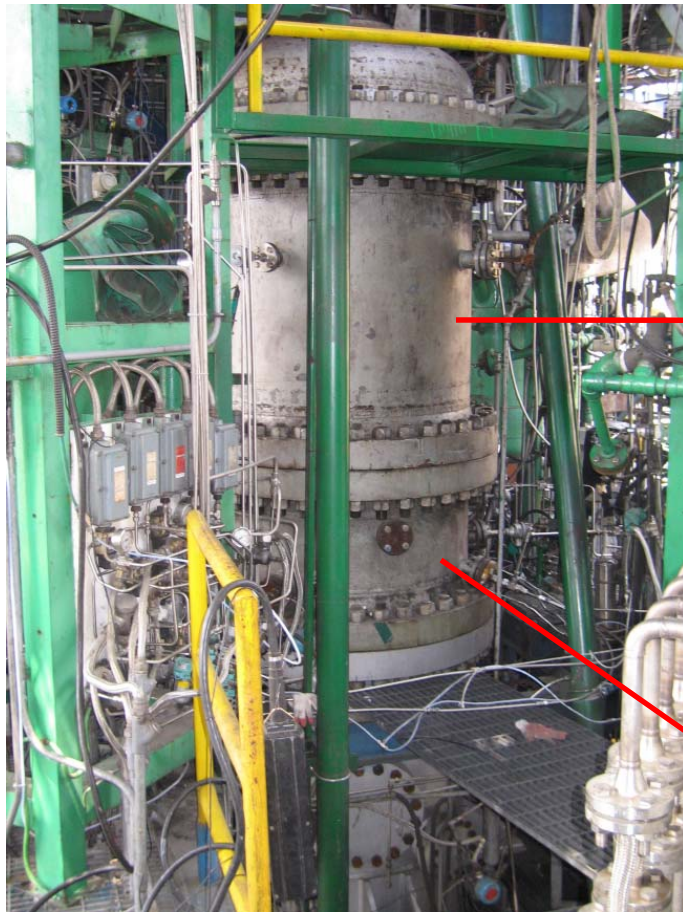


# Process Flow of 3 T/D-Scale Coal Gasification System





# Entrained-Bed Gasifier (Up-flow)

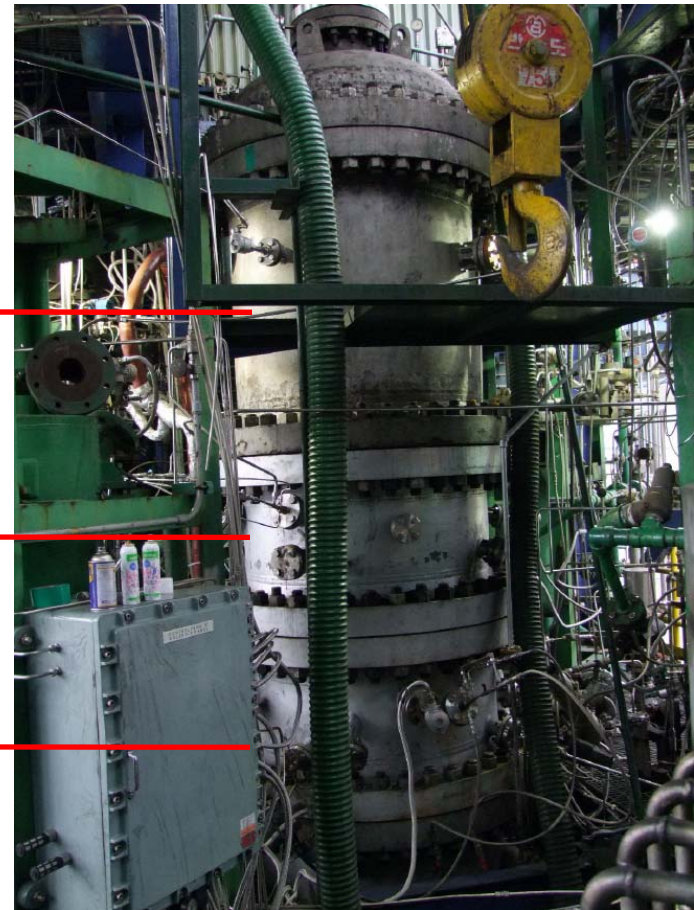


**One-Stage Gasifier**

Upper  
section

Additional  
middle  
section

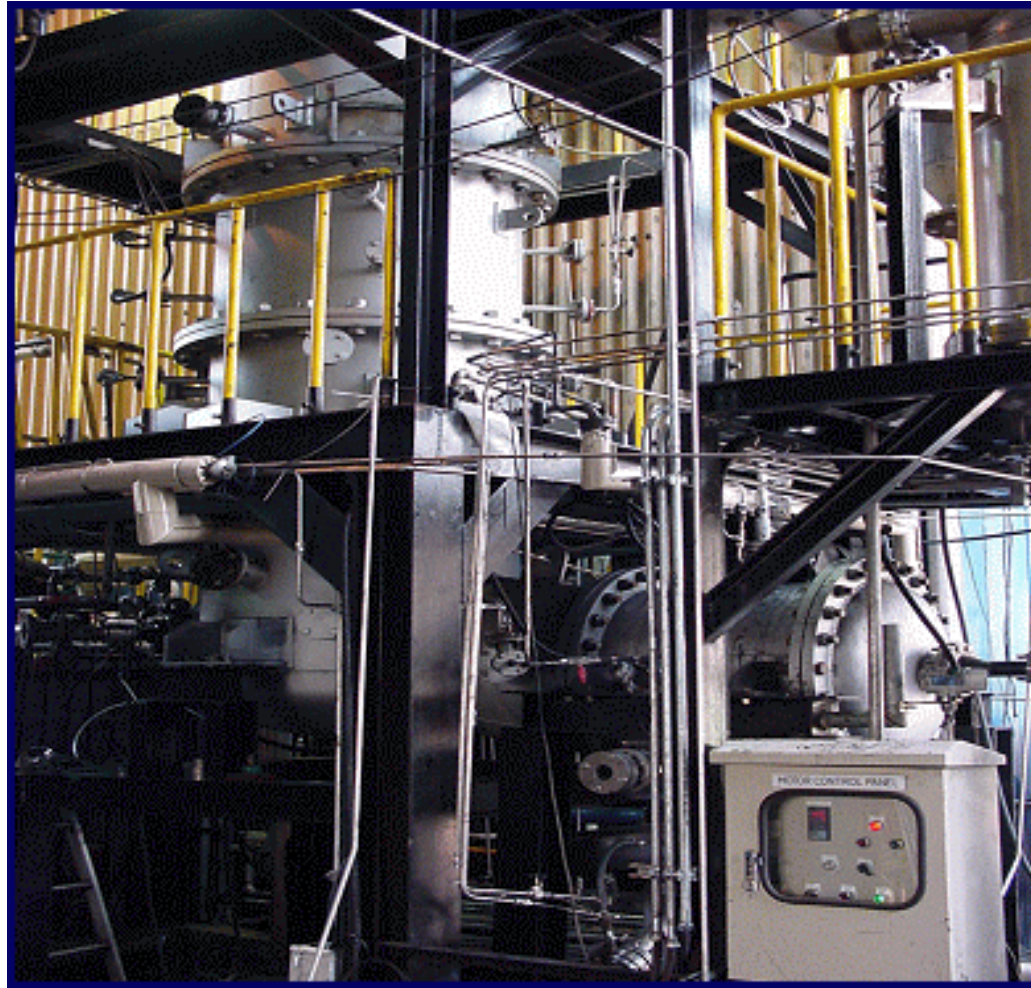
Middle  
section



**Two-Stage Gasifier**

# Entrained-Bed Gasifier (One-stage/Down-flow)

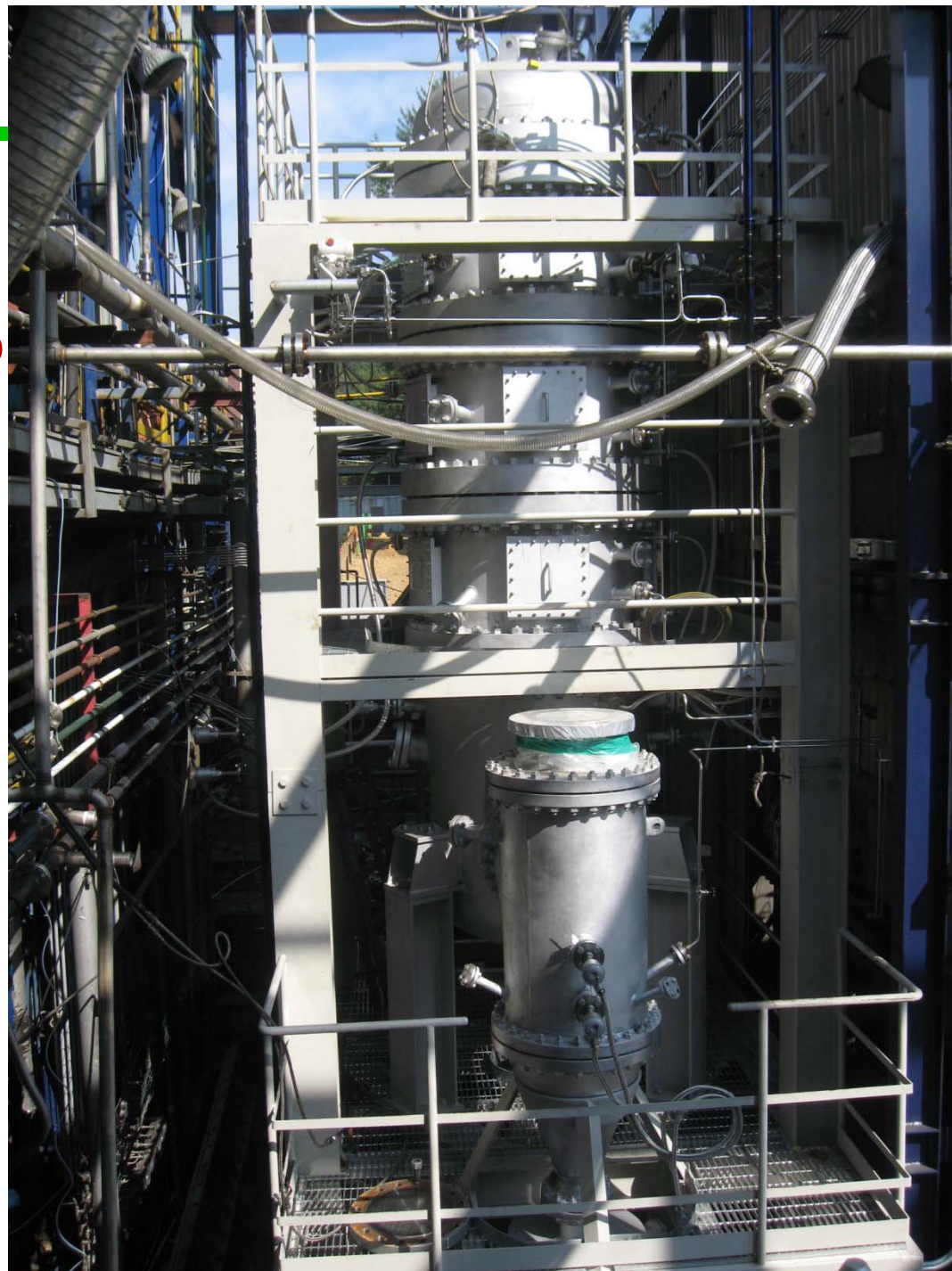
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Entrained-Bed Gasifier for  
Hot Gas Cleanup + One-step  
WGS system



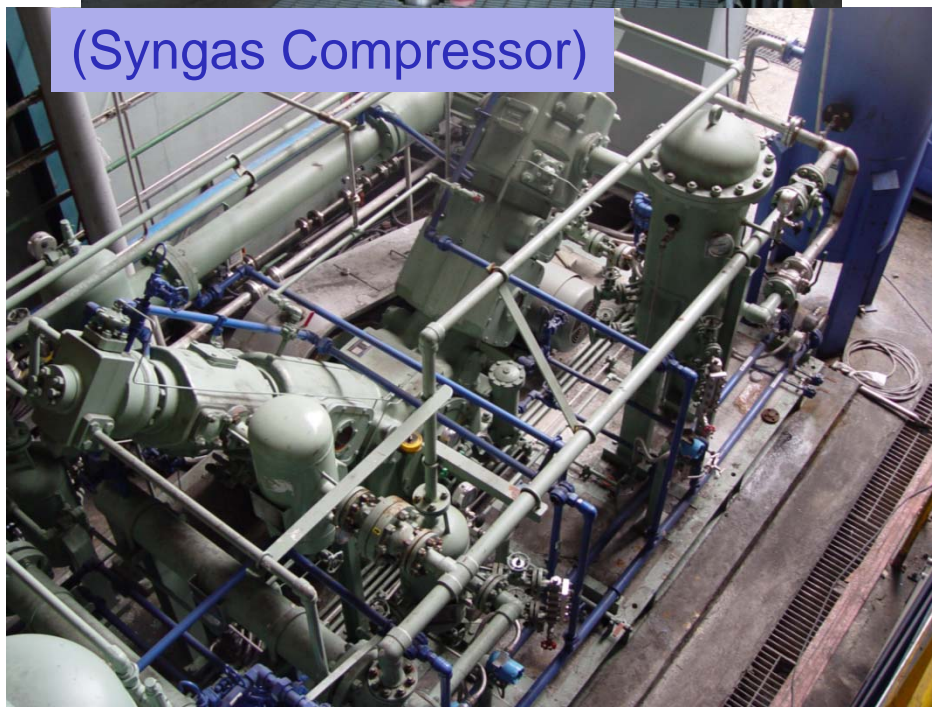


# DME Synthesis Pilot System

(WGS Reactor)



(Syngas Compressor)

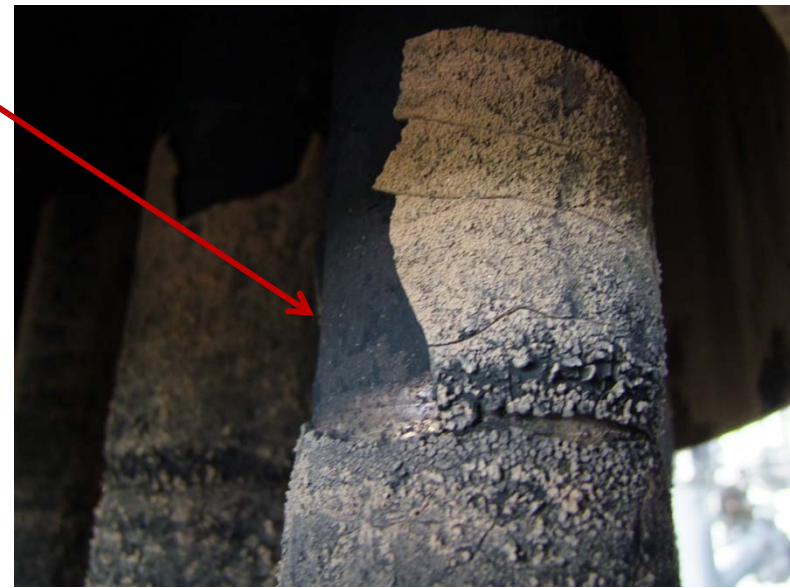
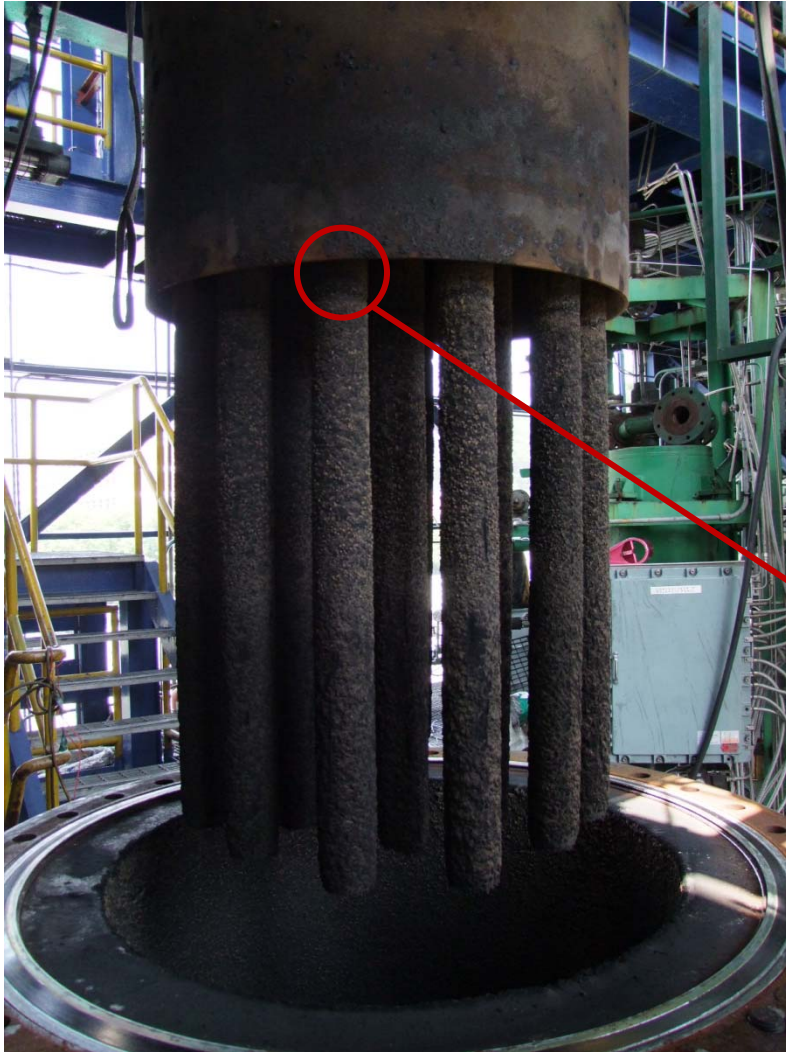


(DME Reactor)





## Metal Filters after Gasification Test (Indonesian coal)

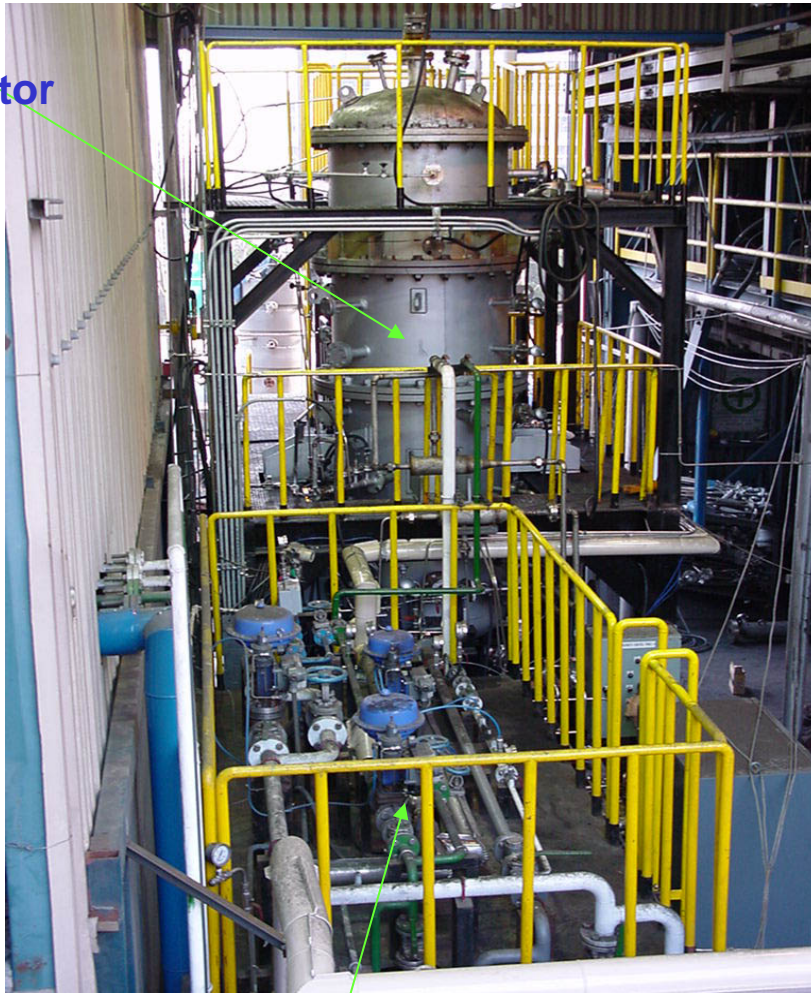




## 2) 1 Ton/Day Waste-Oil Gasification/Melting System

Capacity : Waste-oil 1 ton/day, Max. 10 bar operation

Reactor



Feed/utility supplying system

Waste gas treatment



Slag  
Quen-  
cher

Slurry-type feeding system



# Process Flow of Waste-Oil Gasification/Melting System



□ Oxygen, Nitrogen Supply System



□ Main Control Panel



□ Local Control Panel



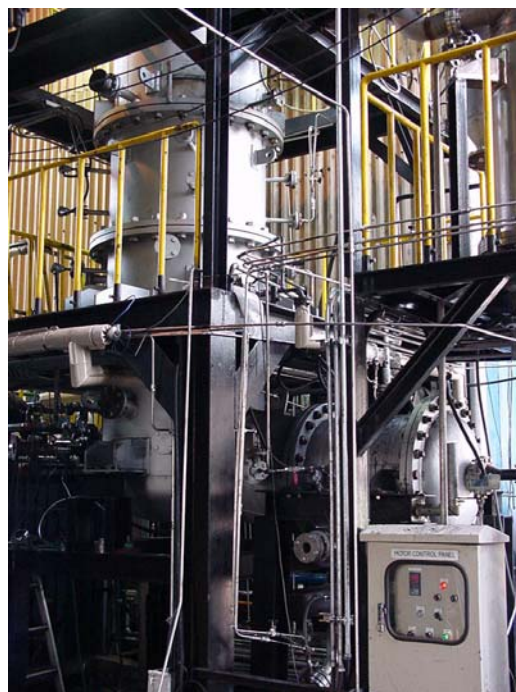
□ Waste Gas Treatment



□ Liquid-type Feeding System



□ Slurry-type Feeding System



□ Gasification/Melting Reactor

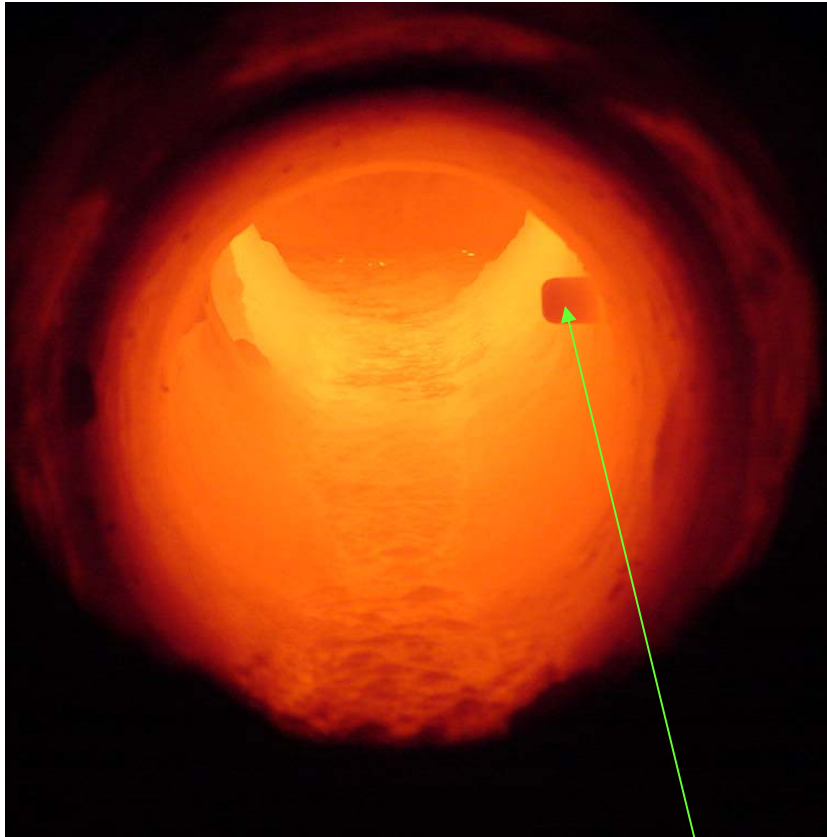


□ Flare stack

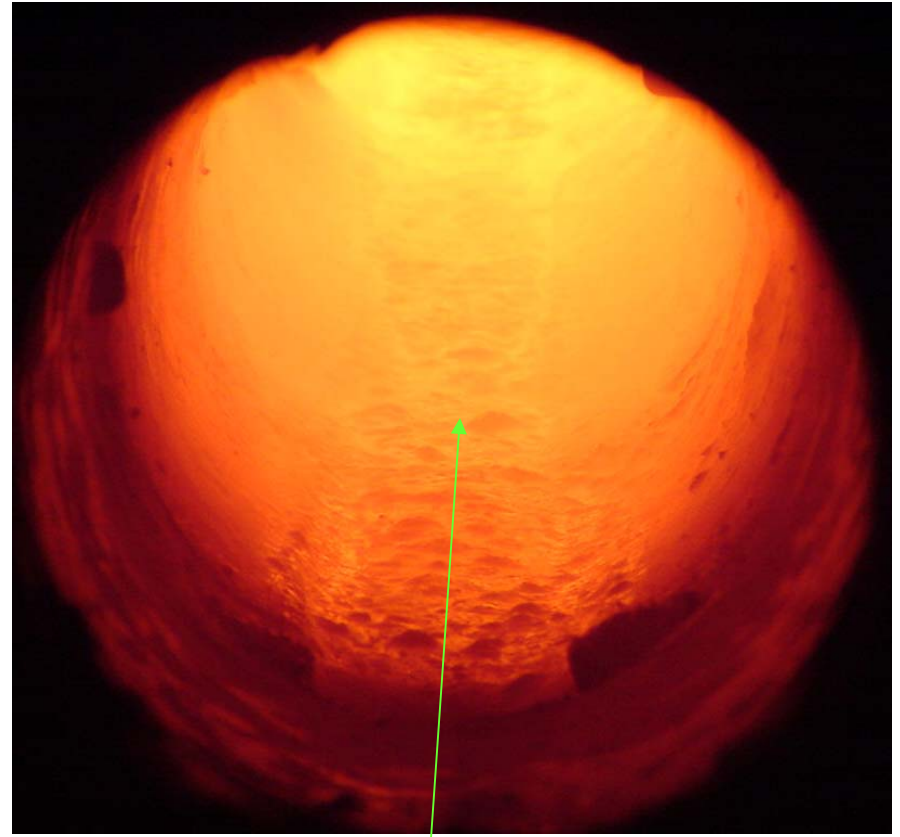


## Flow inside Gasification/Melting Reactor for Waste-Oil/Flyash Feed

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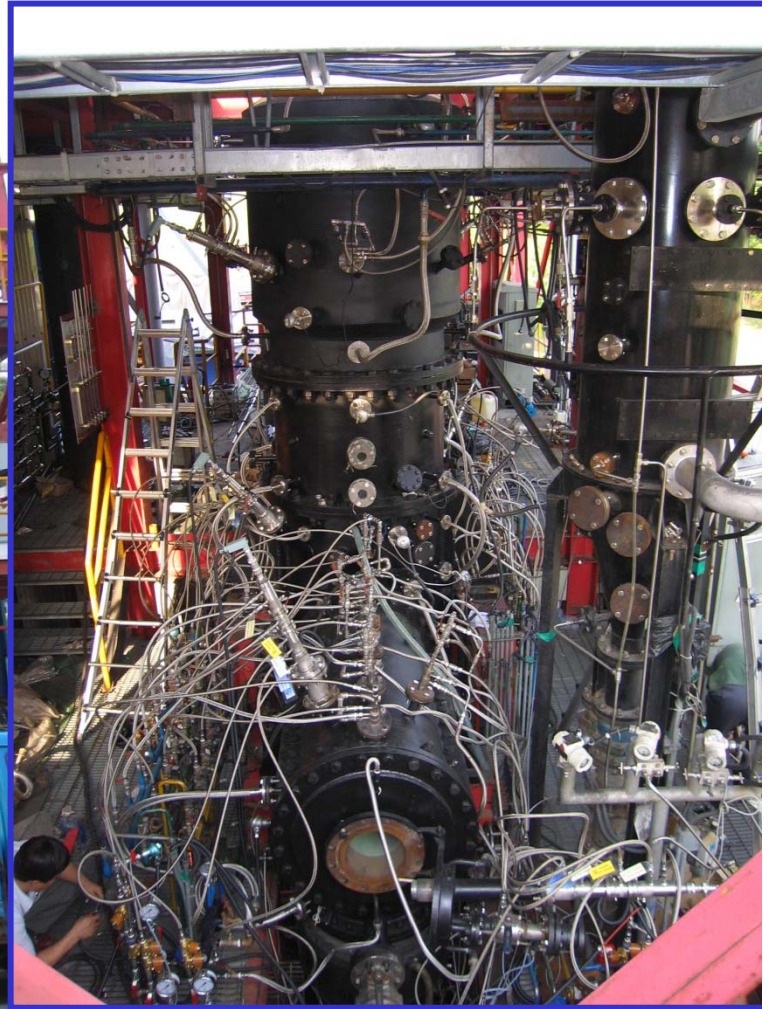


thermocouple



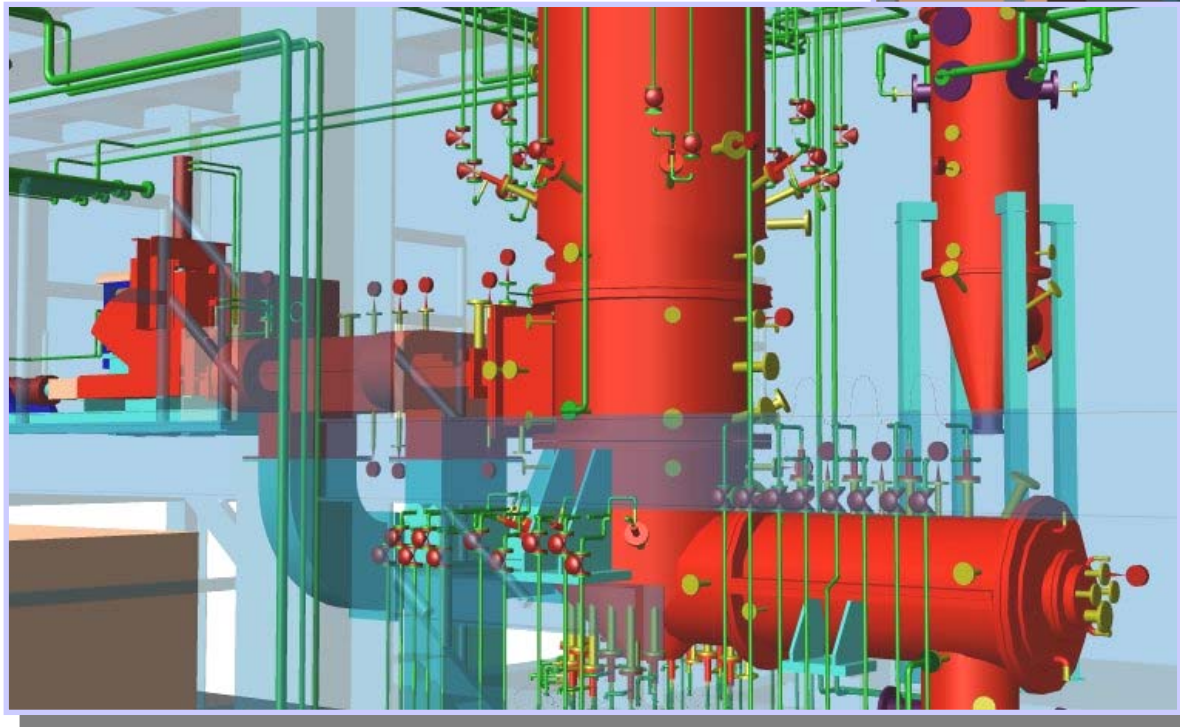
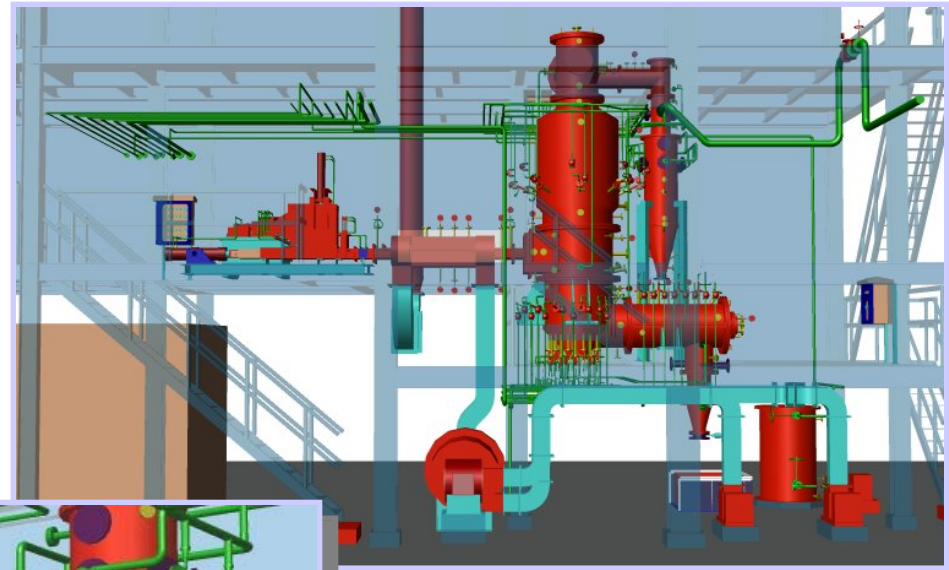
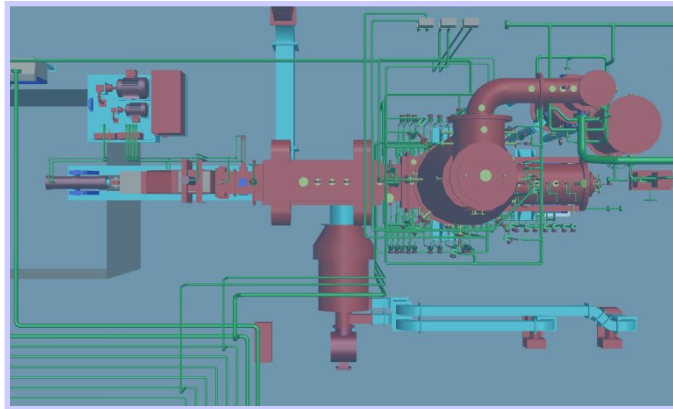
Molten Slag

### 3) 5 Ton/Day Wastes Gasification/Melting Pilot Plant



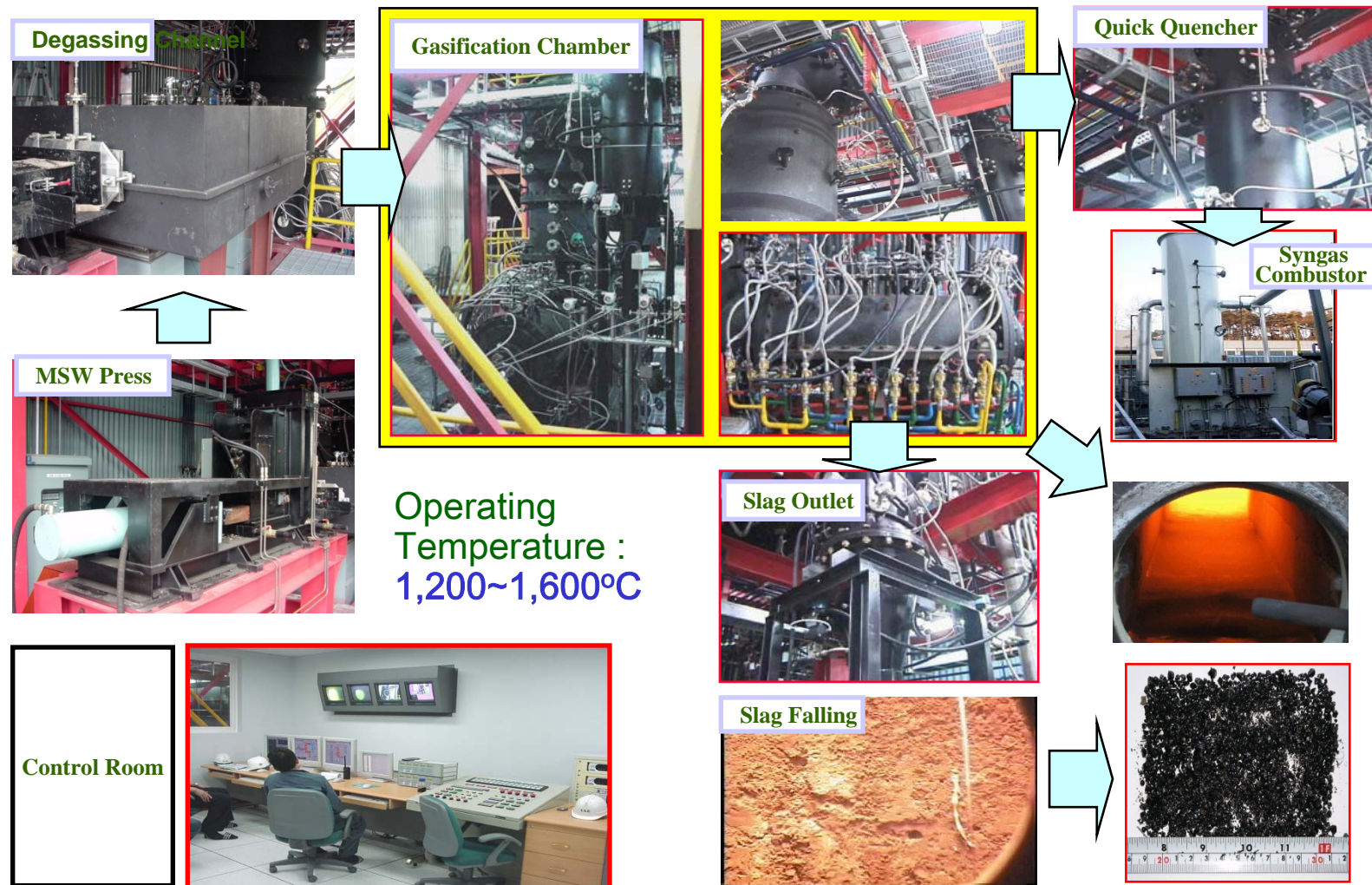


# 3-D Design View of Wastes Gasification System



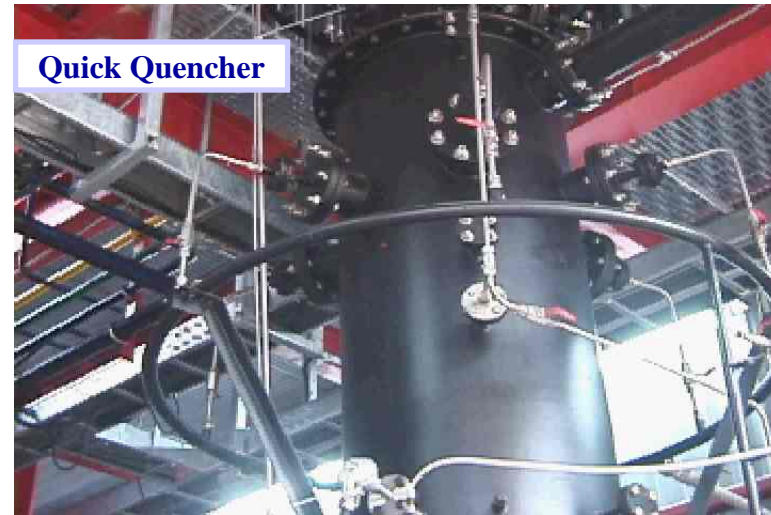
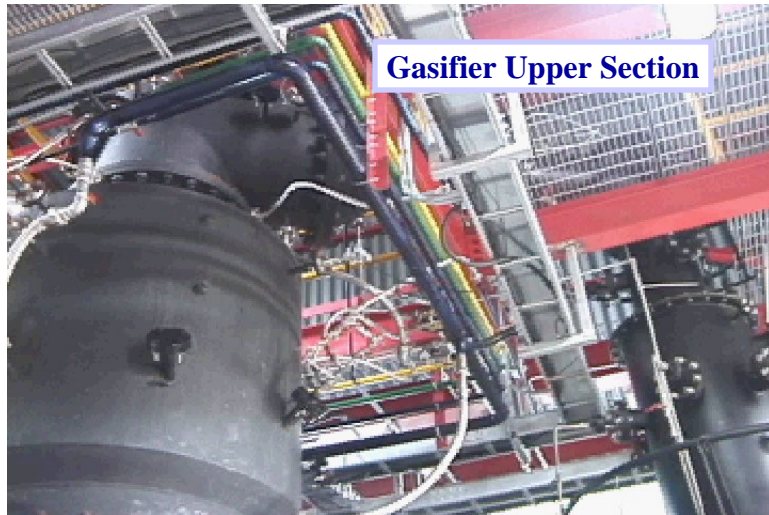
- ◆ Based on Thermoselect™ System
- ◆ Asked by Daewoo Construction Co. to confirm applicability on Korean high moisture MSW in 2003.
- ◆ Obtained a certificate of New Environmental Technology from Korea Ministry of Environment in 2003.

# Process Flow of 5 T/D Wastes Gasification Pilot Plant





# Main Equipments Following Process Flow



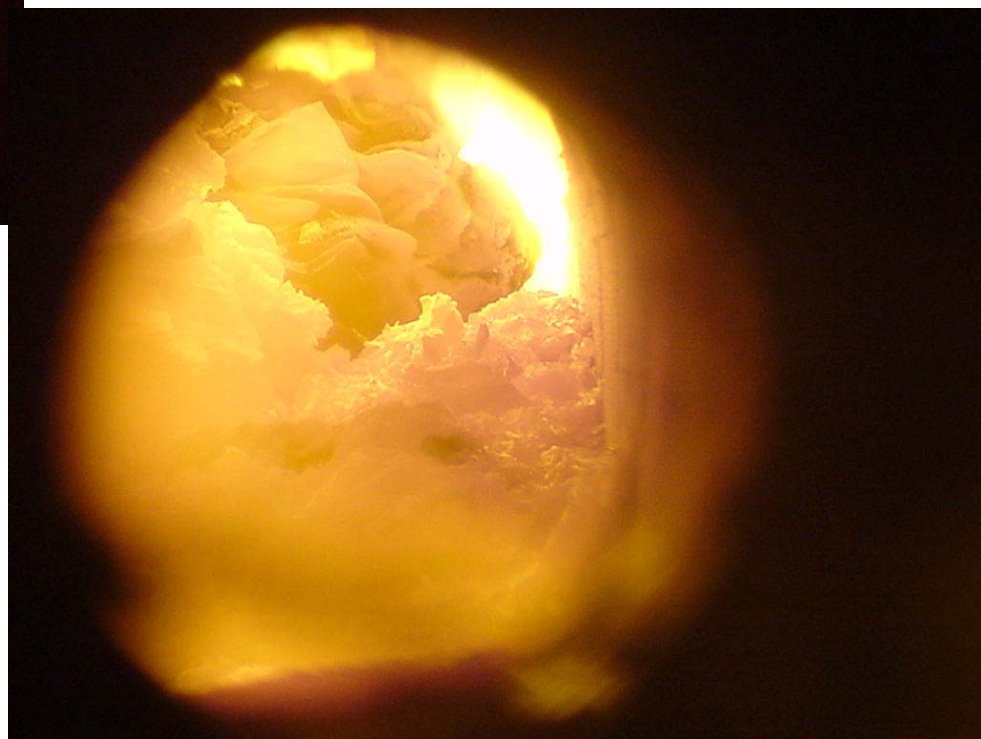
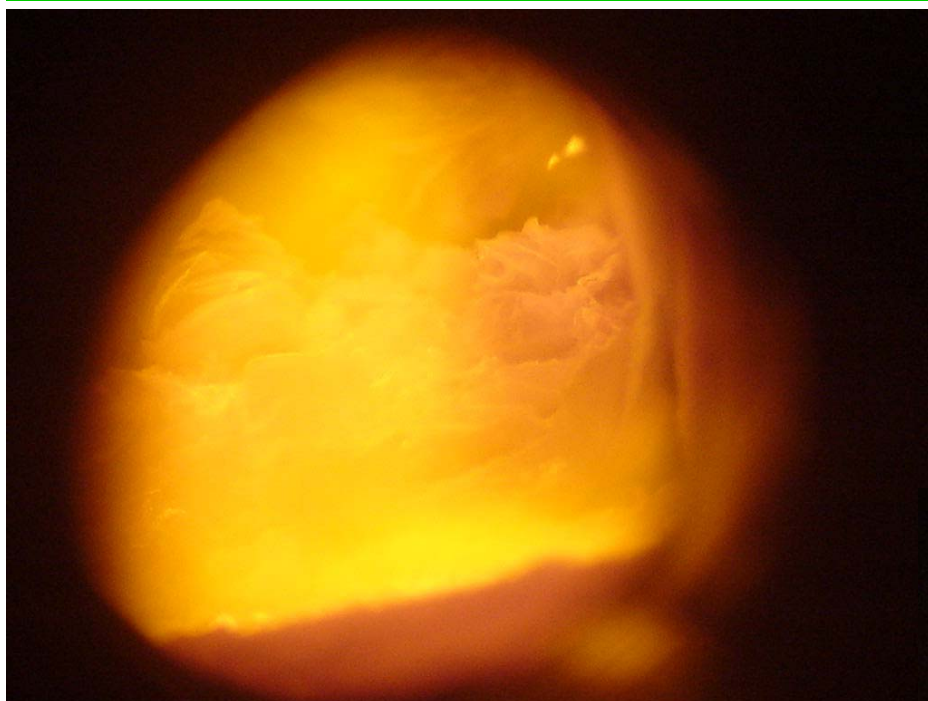


# Typical Municipal Solid Wastes in Korea





## View of Gasification/Melting Main Section



# Slag from 30-50 wt% Moisture-Containing MSW

Molten slag falling from slag tap



Slag falling in slag quencher



Quenched slag

