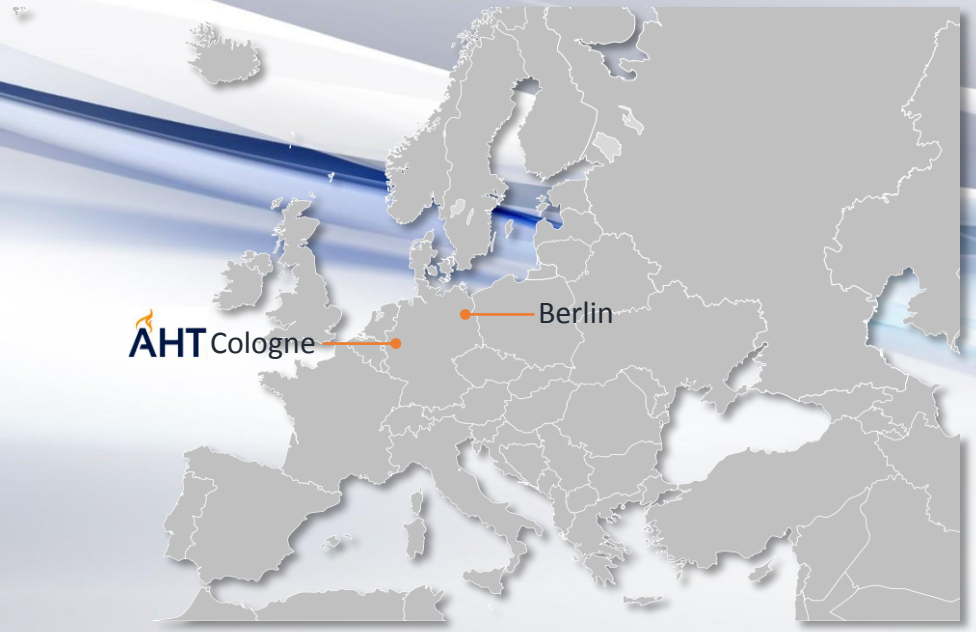
A.H.T. Syngas Technology N.V.

Gas, Heat and Power Generation from Biomass



Content

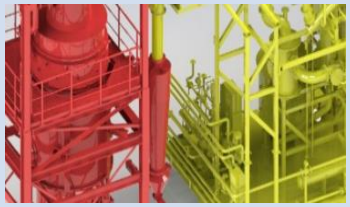
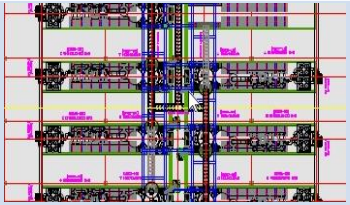
A.H.T. at a Glance

AHT provides state-of-the-art technologies for the gasification process of fossil or biomass feedstocks to generate raw or clean gas.

AHT offers outstanding experience in decentralised, medium sized power plants.

AHT covers the entire value chain from project development to full turn-key solutions and after-sales services.

AHT is a family-founded and owner-run business with a strong commitment to excellence and profitable growth.

Consulting & Empowering	Design & Customisation	Sales, Shipment & Implementation	Maintenance & Services	R&D / Engineering
				

Our Portfolio – Company History

2014 Acquiring of a Dutch shell company, rebranding to A.H.T.. Syngas Technology N.V.

TOMORROW: Positioning as EPC

2010 Spin-out from the preceding company by today's CEO Gero Ferges, system update and improvements

2006 The first commercial large-scale power plants are sold world-wide

1. July 2016 Approval for stock trading at the stock exchange Frankfurt am Main – Entry Standard

2000 Improving market conditions due to German and European Renewable Energy Sources Acts

1997 The Engineering Dynasty Ferges and entrepreneur McDevitt found A.H.T. and improve the original KHD twin-fire technology

Fossil fuels dominate the world market

1864

1864 Foundation of KHD as Deutz AG by N.A. Otto

1867 N.A. Otto builds the first gas-driven combustion engine

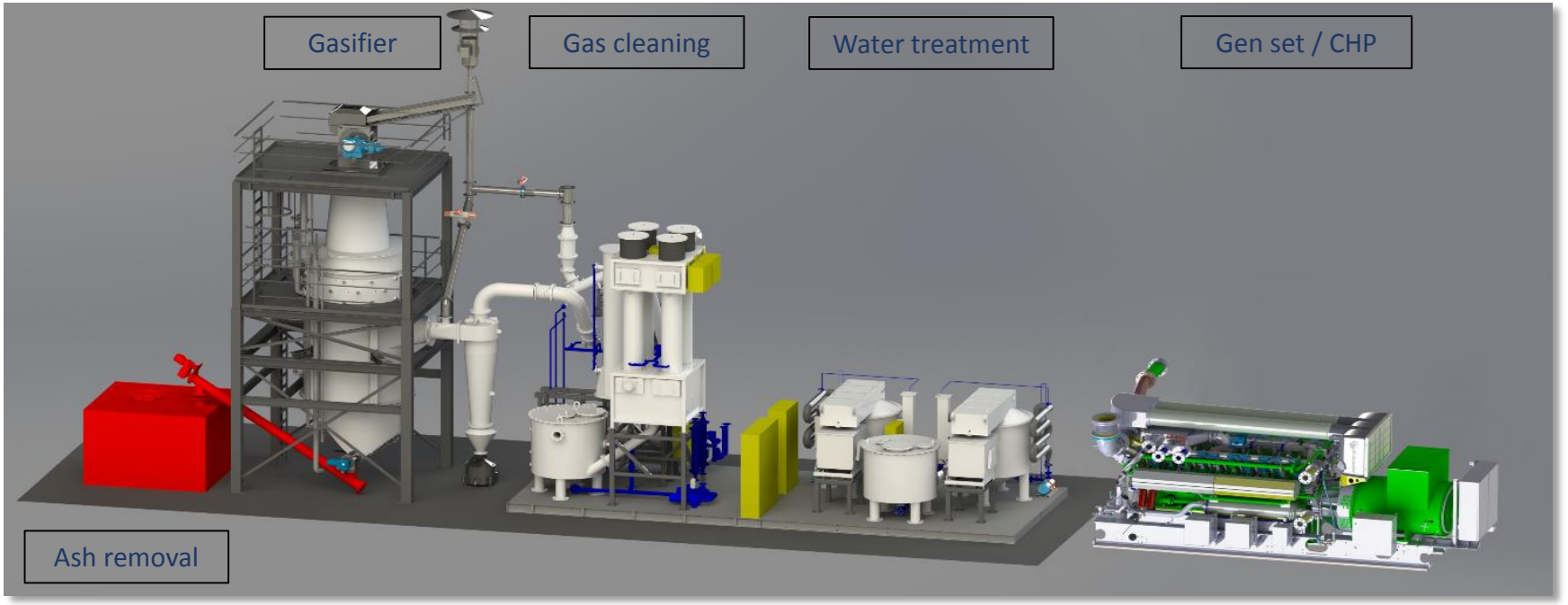
1963 Already approx. 15,000 gas generation plants are delivered by KHD

1945 Approx. 1 million vehicles operate on wood gas

Our Portfolio - Products & Services

COMPACT POWER PLANTS (CPP)	**HOT GAS** for Industrial Applications	**CLEAN GAS** for Decentralised Power Plants	**SERVICES**
Renewable feedstock **50 – 200 kW_{el}**	Fossil and renewable feedstock **600 kW_{th}** - **50 MW_{th}**	Fossil and renewable feedstock **250 kW_{el}** - **12 MW_{el}**	• Project planning • Project management • Spare-parts & maintenance

Process Overview



Feedstock

Preparation

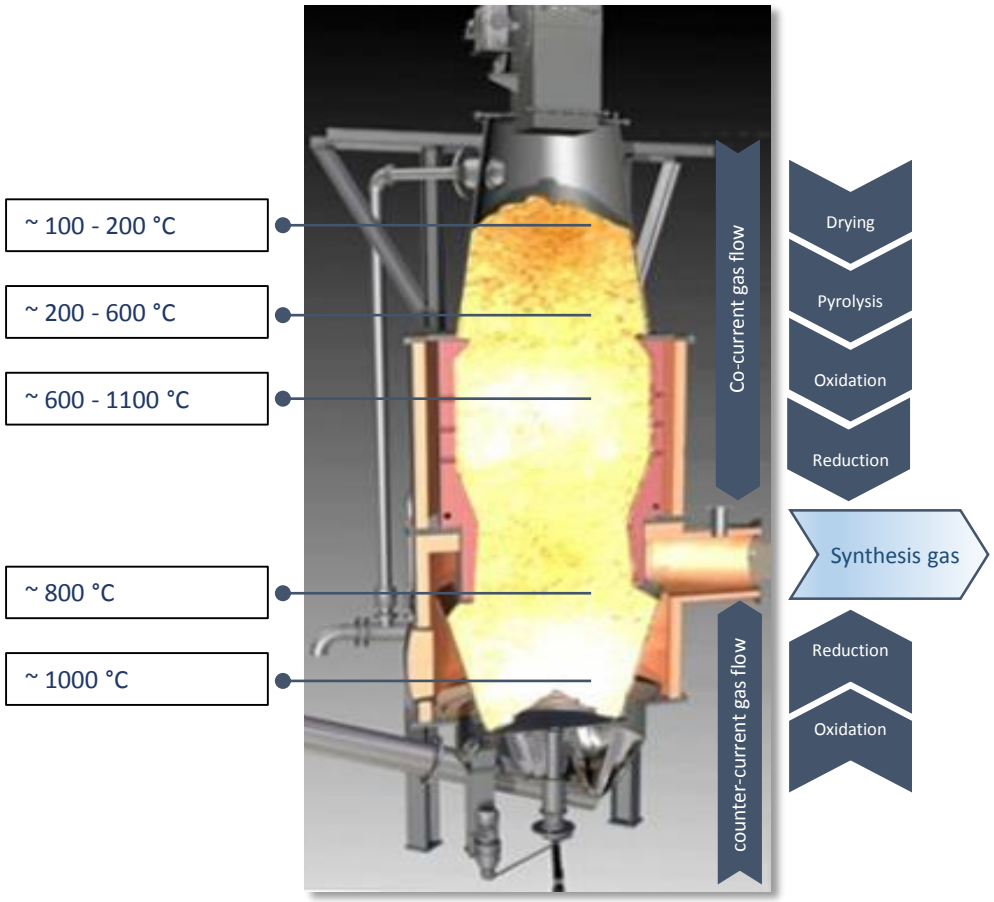
Gas Generation

Gas Conditioning

Heat & Power Generation

Core Technology Gasifier

The twin-fire gasification principle



- Two oxidation and reduction zones in the upper and lower part of the gasifier
- Combination of counter-current and co-current gasification and gas flow
- The generated syngas forms the basis for a clean process gas. Tar and other undesired by-products are cracked in the high-temperature zones, generating a clean synthesis product gas.

- Combination of the advantages of classic co- AND counter-current gasification principle by integration of both gasifier principles:

✓ Avoidance of disadvantages of a counter-current gasification:
  - High tar content

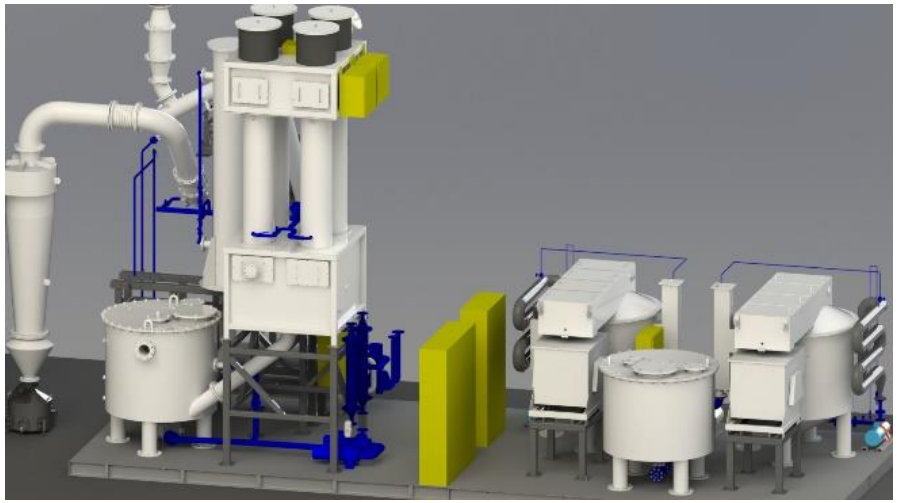
✓ Avoidance of disadvantages of co-current gasification:
  - High dust load, high syngas temperature, high ash and charcoal discharge

✓ Low tar- and ash quantities already during gas generation

Core Technology: Gas Conditioning

Cyclone

Electrostatic Precipitator



Gas conditioning

Water treatment

Gas volume per array: approx. 820 Nm²

- The synthesis gas generated in the gasifier contains smaller amounts of ash and tar as long-chain hydro carbons in gaseous form saturated in the gas
- Ultra-fine and more coarse particles are isolated by the cyclone, gas scrubber and electro-filter unit
- Remaining heavy and volatile particles (tar, sulphur compounds, compounds and heavy metal compounds remain in the flotate

✓ After conditioning, the synthesis gas contains almost no solids, particle size less than 1 µm.

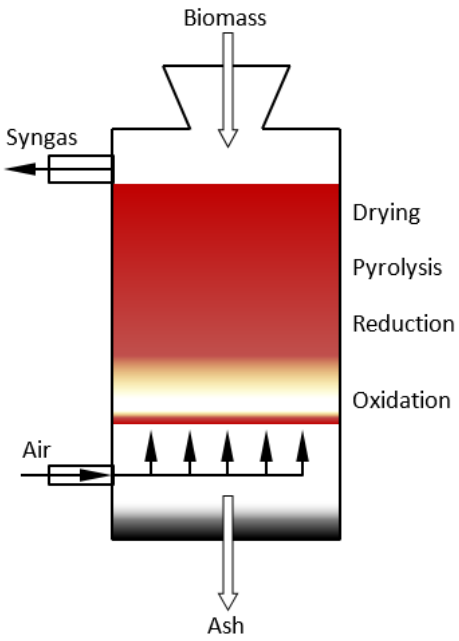
✓ Temperature of the syngas after the gas-conditioning is below the water-absorption point, so that water cannot condensate

✓ The gas-cleaning process ensures a closed circulation, so that no ecologically damaging substances are released and are not able to cause environmental pollution.

Core Technology

Types of fixed-bed gasifiers

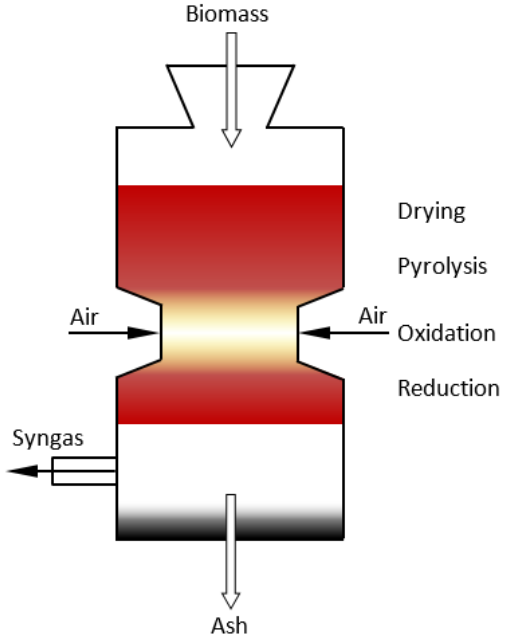
Updraft (counter-current)



High tar content, low ash content

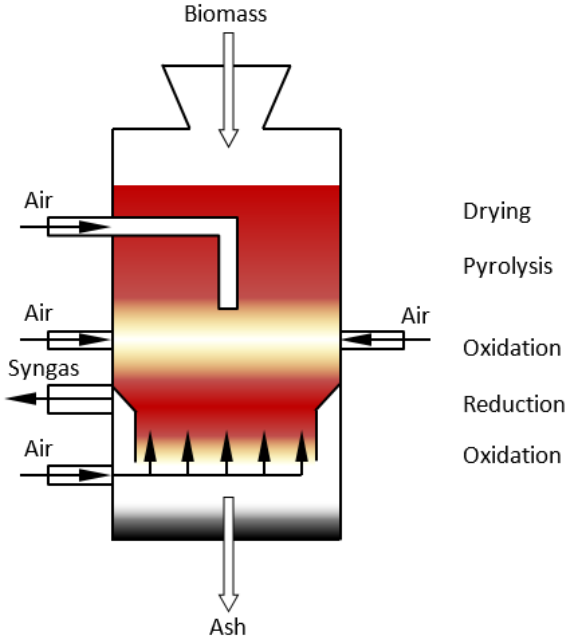
Usually incomplete gasification (char coal remaining in ash)

Downdraft (co-current)



Low tar content, high ash content

AHT Twin-fire (co- & counter-current)



Low tar content, low ash content

Almost complete gasification

Feedstock Types

Broad range of original or briquetted feedstock: wood chips, saw dust, empty fruit bunches, straw, Miscanthus, (low grade) coal, etc.

Feedstock: Carbonised Hydrochar

MIXED BIOMASS RESIDUES (e.g., manure, digestates, sludge)

HTC / VTC

PROCESS WATER

FERTILISER

H_2

Hydrogen

ELECTRICITY

HYDROCHAR FERTILISER

GAS GENERATION & TREATMENT

HEAT/STEAM REFEEDING TO HTC / VTC PROCESS

HEAT/COLD

References

Location:
Tayan, Kalimantan / INDONESIA

Application:
Clean Gas to Power

Feedstock:
Coal

Output:
6 MW_{el}

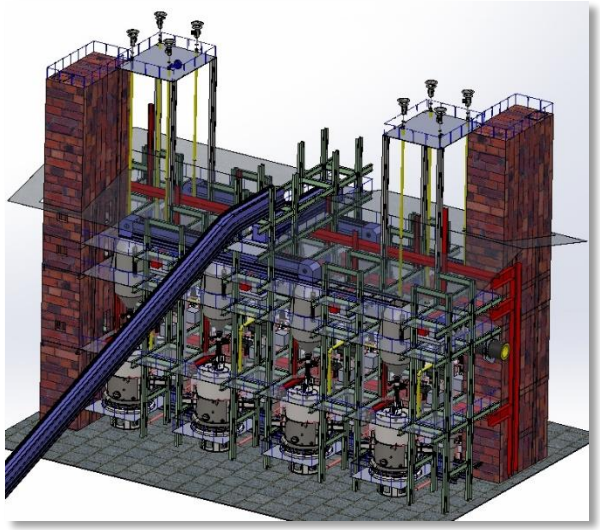
References

Location:
Basantpur, Odisha / INDIA

Application:
Hot gas for iron ore production

Feedstock:
Coal

Output:
40 MW_{th}



References

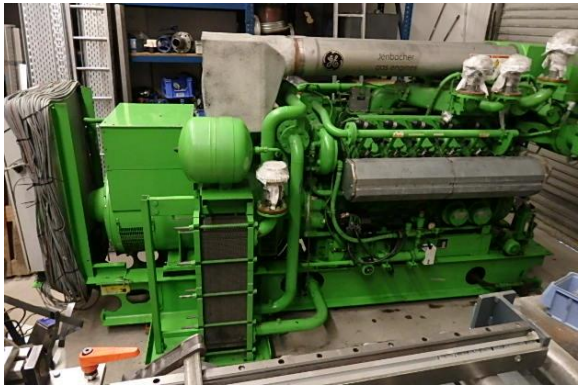
Location:
Chur / SWITZERLAND

Application:
Clean gas, heat & power

Feedstock:
Hydrochaar from sludge

Output:
200 kW_{el} / 185 kW_{th}

- Commissioning
- Can be used for trials



References

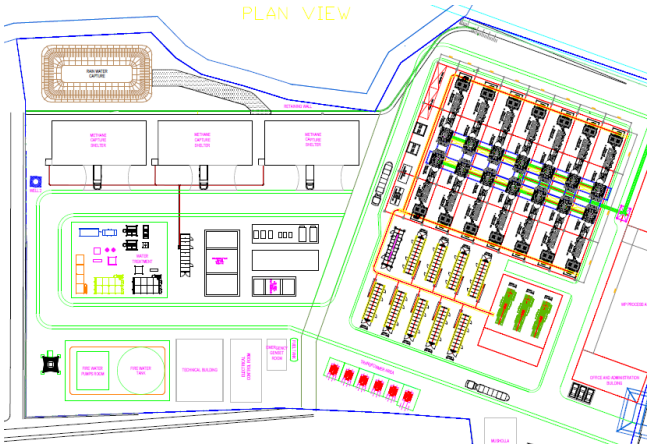
Location:
Surakarta, Java / INDONESIA

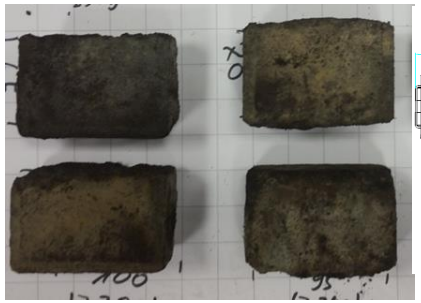
Application:
Clean gas, power

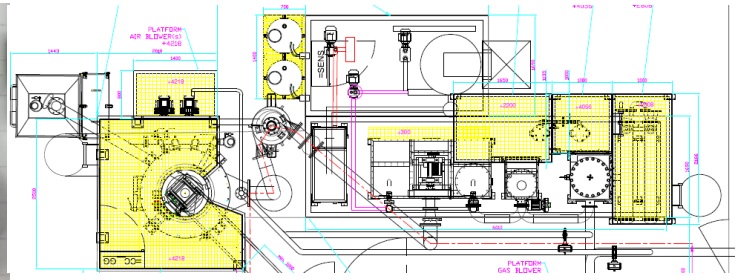
Feedstock:
Hydrochar from MSW

Output:
10,000 kW_{el} in phases

- Detail engineering in execution
- Pilot plant (150 kW_{el}) installed
- Trial campaignes possible







References

Location:
Kesennuma / JAPAN

Application:
Clean gas, heat and power

Feedstock:
Woodchips

Output:
800 kW_{el}

Contact

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