

NOTAR® Technology is a 3 steps process that allows waste conversion into a clean No-Tar gas

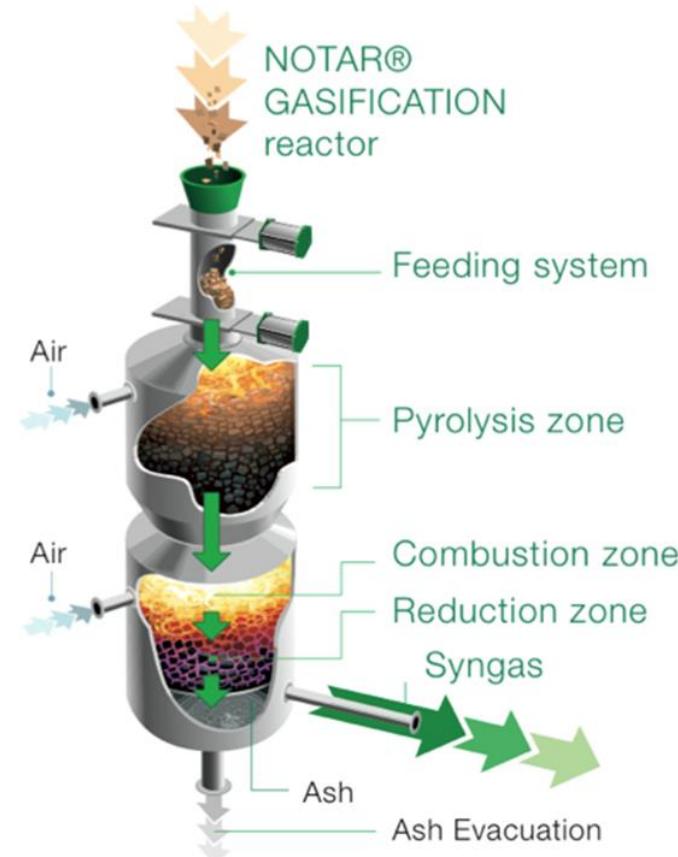
The NOTAR® principle lies on the physical separation of the reaction zones. This leads to accurate control of the critical parameters

Pyrolysis

Combustion

Reduction

Integration of the reaction zones in the NOTAR® reactor makes the NOTAR® the sole industrial gasifier producing a CLEAN SYNGAS at the outlet of the gasifier.



1st Step – Pyrolysis of biofuel into a “Tar Free Char”



Heat is used to break down the fresh solid fuel into Charcoal (C) and into Pyrolysis gases (a mixture of light gases and tar (mainly primary & secondary tars, but almost no tertiary))).



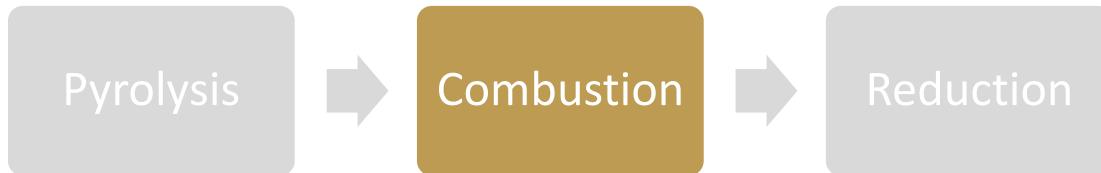
Key advantages of the NOTAR® Technology

- **Autothermic Pyrolysis:** Heat needed for the pyrolysis is developed by partial combustion of the raw biomass within the pyrolyzer.
- **Complete Pyrolysis:** The physical separation of the pyrolysis zone from the other reaction zones offers a precise control of the various reaction parameters (residence time, temperature).

The two products from the pyrolysis stage are:

- **« Tar Free » Char :** Biomass is pyrolysed into Charcoal in such a way that it does not contain tar nor potential tar.
- **Pyrolysis gases:** The produced gases during the pyrolysis contain the pyrolysis tar. Tar in the pyrolysis gases are mainly primary & secondary tars, easily destructed in the combustion zone.

2nd Step – Combustion of the pyrolysis gases destructs tar



Air is injected above the combustion, in the gaseous phase, zone to burn the pyrolysis gases and destroys remaining tars.



Key advantages of the NOTAR® Technology

- It **destroys the pyrolysis tar** by combustion and thermal cracking to produce “**Tar Free**” Flue Gases
- Air doesn’t enter in contact with the char, **avoiding the creation of clinkers**
- Accurate design of the gaseous combustion zone (**improved air/gas mixture, accurate residence time**)
- Accurate control of the combustion parameters (**temperature**)
- Air enters in the gaseous phase, thus enabling perfect repartition and reliable reactor scale up

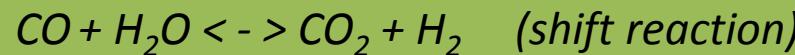
3rd Step – tar free char and tar free combustion gases react and produce a tar free gas

Pyrolysis

Combustion

Reduction

In the reduction zone, the « Tar Free » charcoal (C) reacts with the « Tar Free » flue gases from the oxidation zone (CO_2 , H_2O). The clean syngas is produced following the reactions:



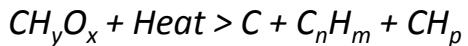
Key advantages of the NOTAR® Technology

- The reactants of the reduction (CO_2 , H_2O , C) being « Tar Free », the syngas doesn't contain tar.
- NOTAR means NO – TAR in the syngas!
- Maximum syngas temperature at the outlet of the gasifier is 700°C, metallic compounds condense or solidify in biochar (bottom ashes) extracted at the bottom of the gasifier

Compact integration of the 3 reaction zones has key advantages

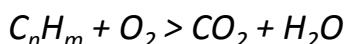
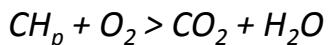
REACTION ZONE

1. PYROLYSIS



- Accurate control of operating parameters:
- Tar Free Char (C)
 - Tar concentrated in pyrolysis gases (C_nH_m)

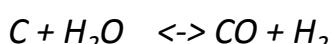
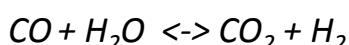
2. COMBUSTION



Combustion in gaseous phase :

- Destruction of Pyrolysis Tars
- Conversion of waste with high ash content
- Allow reactor size scale up

3. REDUCTION



Reduction is fed with Tar Free products:

- Production of a Tar Free gas

Maximum Gas Temperature of 700°C:

- Metallic Compounds condensed in Char

NOTAR® Technology is the integration of 3 separately controlled compartments assembled in a **compact** way.

The technology is able to produce **clean gas** from a diversity of solid fuels

TECHNOLOGICAL ADVANTAGE

