

# NOTAR<sup>®</sup> Technology is a 3 steps process that allows waste conversion into a clean No-Tar gas

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

Pyrolysis

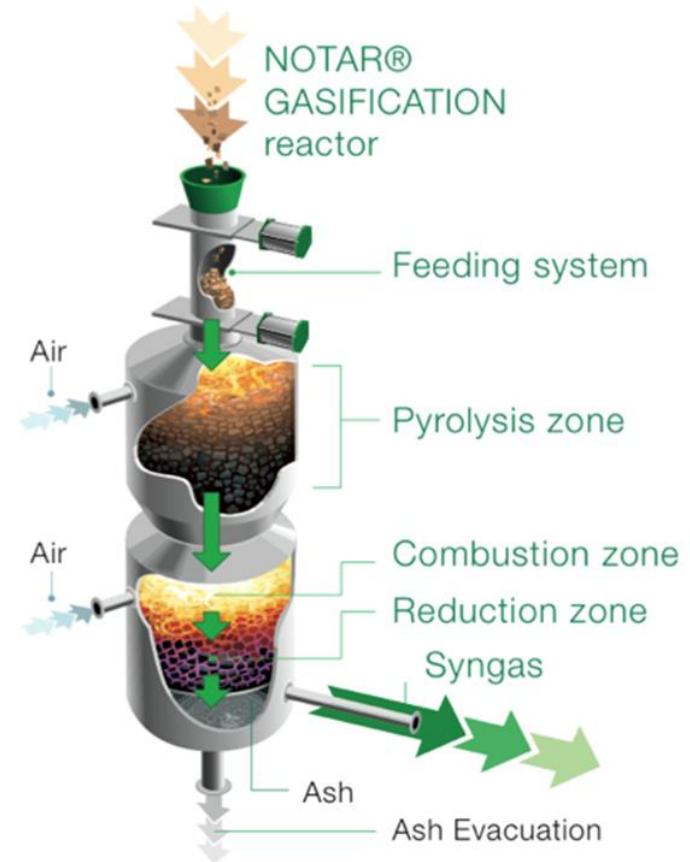


Combustion



Reduction

Integration of the reaction zones in the NOTAR<sup>®</sup> reactor makes the NOTAR<sup>®</sup> 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.



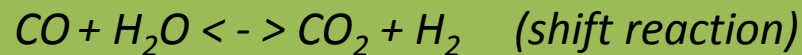
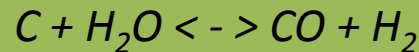
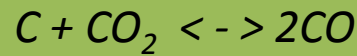
### Key advantages of the NOTAR® Technology

- 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

## 3<sup>rd</sup> Step – tar free char and tar free combustion gases react and produce a tar free gas



In the reduction zone, the « Tar Free » charcoal (C) reacts with the « Tar Free » flue gases from the oxidation zone (CO<sub>2</sub>, H<sub>2</sub>O). The clean syngas is produced following the reactions:



### Key advantages of the NOTAR® Technology

- The reactants of the reduction (CO<sub>2</sub>, H<sub>2</sub>O, C) being « Tar Free », the syngas doesn't contain tar.

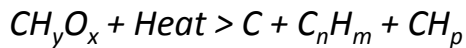
## NOTAR means NO – TAR in the syngas!

- 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

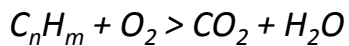
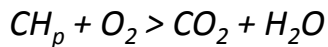
# Compact integration of the 3 reaction zones has key advantages

## REACTION ZONE

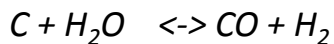
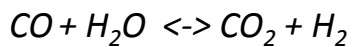
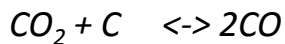
### 1. PYROLYSIS



### 2. COMBUSTION



### 3. REDUCTION



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

Accurate control of operating parameters:

- Tar Free Char (C)
- Tar concentrated in pyrolysis gases ( $C_nH_m$ )

Combustion in gaseous phase :

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

Reduction is fed with Tar Free products:

- Production of a Tar Free gas

Maximum Gas Temperature of 700°C:

- Metallic Compounds condensed in Char

