

BIOMASS GASIFICATION



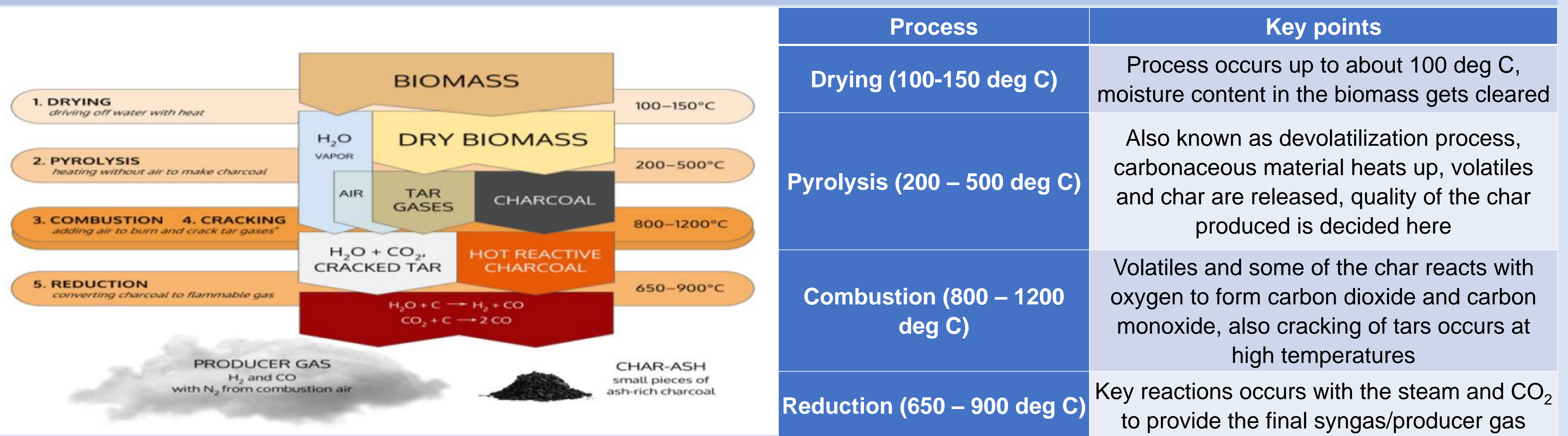
Combustion Vs Gasification

“Combustion is the Oldest method of Harnessing Energy from Biomass”



Process	Combustion	Gasification
Feed	Biomass	Biomass
Oxidant	Air	Air, Oxygen, Steam
Oxygen stoichiometry	6 kg of air	2 kg of air
Heat supply	Auto-thermal	Auto-thermal
Operating temperature(deg C)	850 - 1200	550-900
Gas/Energy	Inert	Combustible
Calorific value(MJ/Kg)	Nil	5 to 12
Main products	Gases such as CO ₂ , H ₂ O, N ₂ , heat	Gases such as H ₂ , CO, CO ₂ , CH ₄ , N ₂ , H ₂ O heat and tar

Key processes in gasification



Key reactions in gasification

Chemical Reactions	Identified as
$C + H_2O \rightarrow CO + H_2$	Water-Gas Reaction (-131.4 kJ/mole)
$C + CO_2 \rightarrow 2CO$	Boudouard Reaction (-172.6 kJ/mole)
$C + 2H_2 \rightarrow CH_4$	Methanation Reaction (+75 kJ/mole)
$CO + H_2O \leftrightarrow CO_2 + H_2$	Water-Gas-Shift Reaction (+41.2 kJ/mole)

