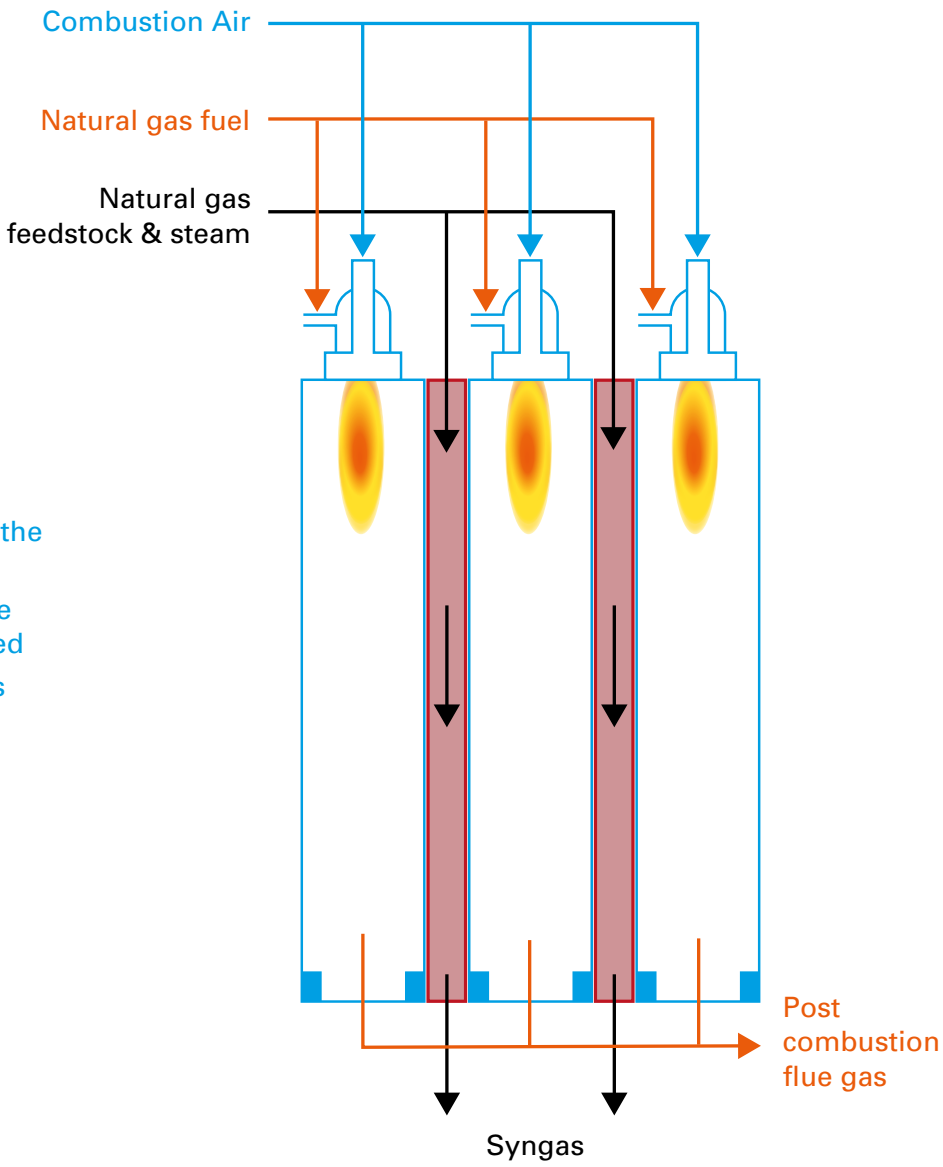
Steam Methane Reforming Chemistry

sbh4 consulting



Notes:
- In the SMR the air/fuel combustion reaction takes place in a separate part of the equipment to the reforming reaction
- SMR may alternatively be side-fired or upwards-fired
- Red shaded area denotes catalyst bed

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	Steam Methane Reforming – SMR
Carbon feedstock	Natural gas, refinery gas or naphtha
Oxygen input	Air for fuel combustion to heat the reforming process
Steam feedstock	From waste heat recovery boiler
Catalyst	Nickel
Target chemical reactions	$CH_4 + H_2O \rightarrow CO + 3H_2$
Additional side reactions	$CO + H_2O \rightarrow CO_2 + H_2$
Energy required/released	Endothermic, requires heat input
Hydrogen content in syngas	~70% H_2, balance CO, CO_2 and CH_4
Syngas pressure	15 to 40 bar, 25 bar is typical
Syngas temperature	850 °C
Downstream process	Water-gas shift: $H_2O + CO \rightarrow H_2 + CO_2$